

Owner's Manual



McCORMICK-DEERING
FARMALL



INTERNATIONAL HARVESTER COMPANY

180 N. Michigan Ave.

Chicago 1, Illinois

TO THE *FARMALL OWNER

Please accept our congratulations on your investment in an International Harvester tractor as your new power partner. We feel sure you will obtain from this machine the economical and superior performance it is designed to give. It is certain that you will derive a large measure of personal satisfaction from operating it.

Years of tractor manufacturing experience and actual contact with agricultural problems in the field have been combined with advancements in engineering and metallurgical science to produce all the features and refinements built into your Farmall. The liberal use of precision-type bearings, the heavy-duty crankshaft, force feed lubrication, dependable ignition, extra large flywheel and the large air, oil and fuel cleaners are some of the features that give your tractor its eager power to do all your power jobs with thoroughness, speed and economy. Properly adjusted, operated, and maintained, this tractor will respond to every reasonable demand you make upon it and give you reliable service for years to come.

* Registered trade-mark. Only International Harvester builds Farmall Tractors.

*A complete list of parts for this tractor
will be supplied on request.*

It is the policy of International Harvester Company to improve its products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to make such changes on tractors sold previously.

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INTRODUCTION

Assembled in this book are operating and maintenance instructions for the Farmall Cub. This material has been prepared in detail in the hope that it will prove helpful to you in providing a better understanding of the correct care and efficient operation of your tractor.

If you should need information not given in this manual, or require the services of a trained mechanic, get in touch with the International Harvester dealer in your locality. Dealers are kept informed on the latest methods of servicing tractors. They carry stocks of IH parts, and are backed in every case by the full facilities of a nearby International Harvester branch.

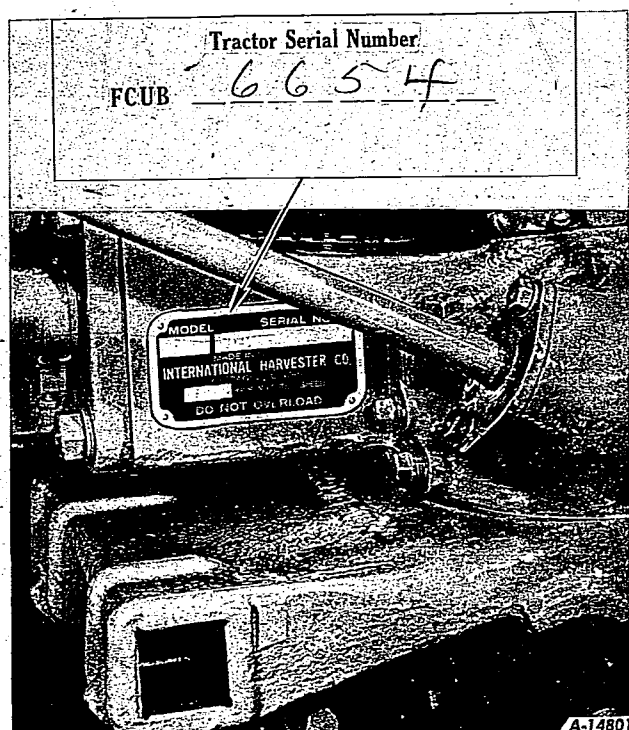
Throughout this manual the use of the terms LEFT, RIGHT, FRONT and REAR must be understood to avoid confusion when following instructions. LEFT and RIGHT indicate the left and right sides of the tractor when facing forward in the driver's seat. Reference to FRONT indicates the radiator end of the tractor, and REAR the drawbar.

When in need of parts, always specify the tractor and engine serial numbers. The tractor serial number is stamped on a name plate attached to the

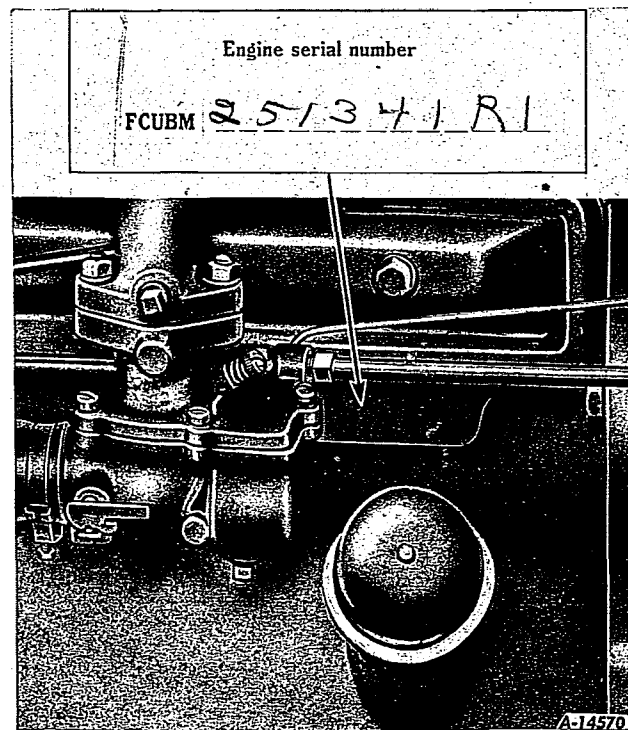


steering gear housing on the right side of the tractor. The serial number is preceded by the letters FCUB, *Illust. 1*. The engine serial number is stamped on the left side of the engine crankcase to the right of the carburetor. This serial number is preceded by the letters FCUBM, *Illust. 2*.

For ready reference, we suggest that you write these serial numbers in the spaces provided below.

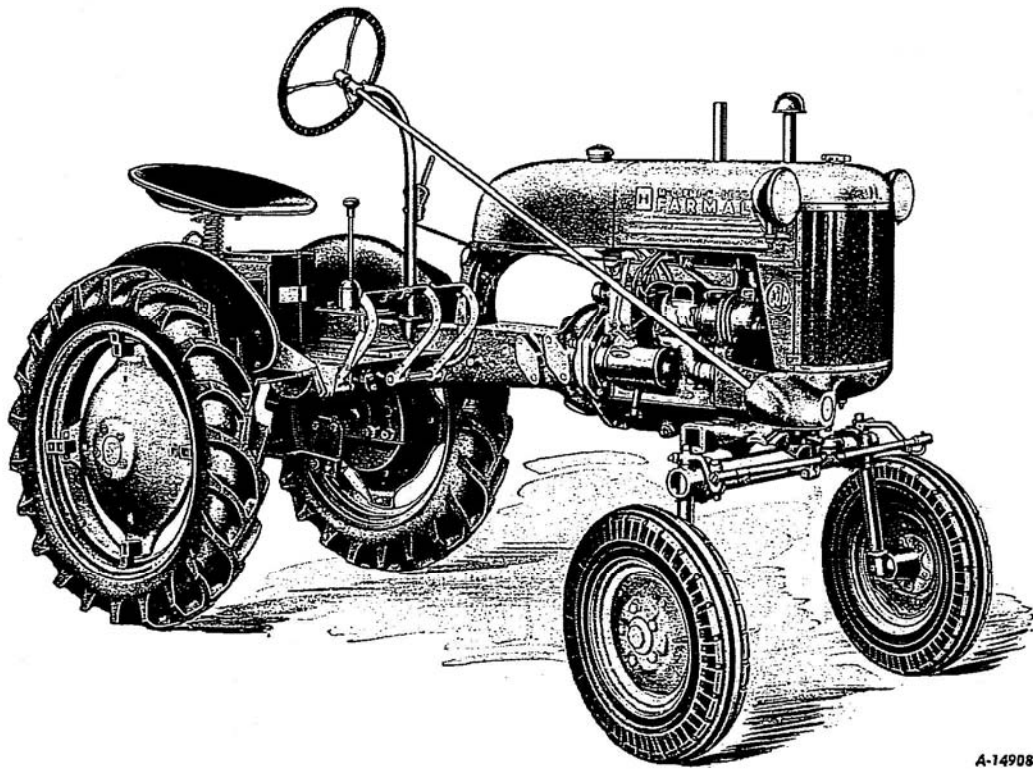


Illust. 1—Location of Tractor Serial Number.



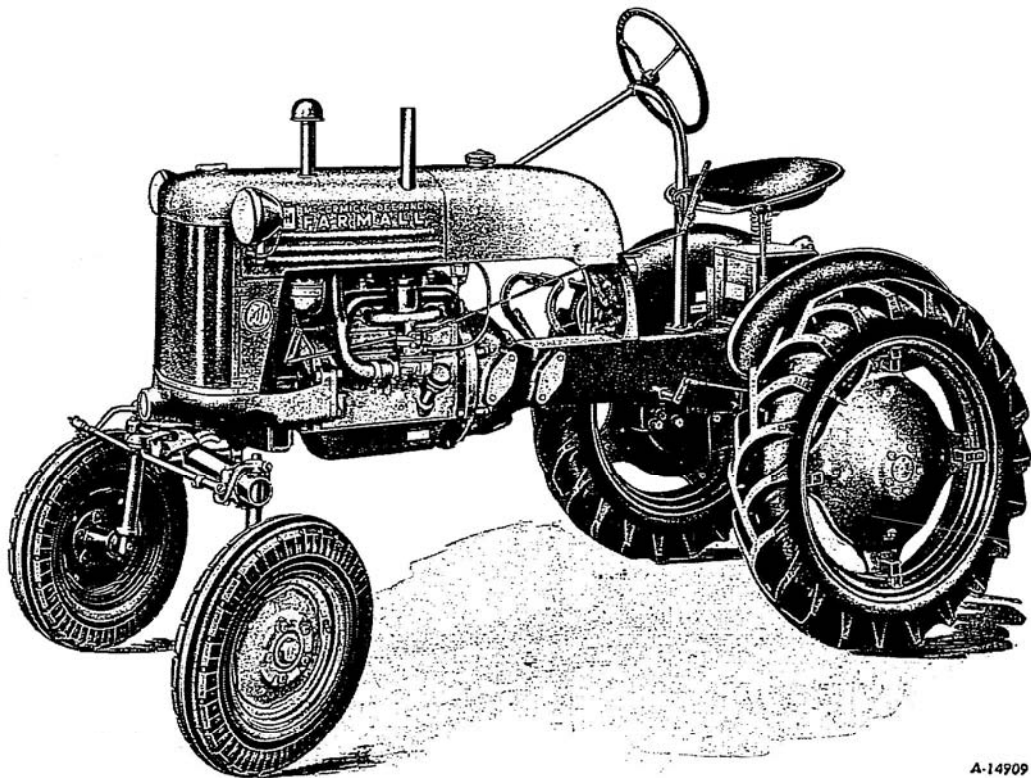
Illust. 2—Location of Engine Serial Number.

DESCRIPTION



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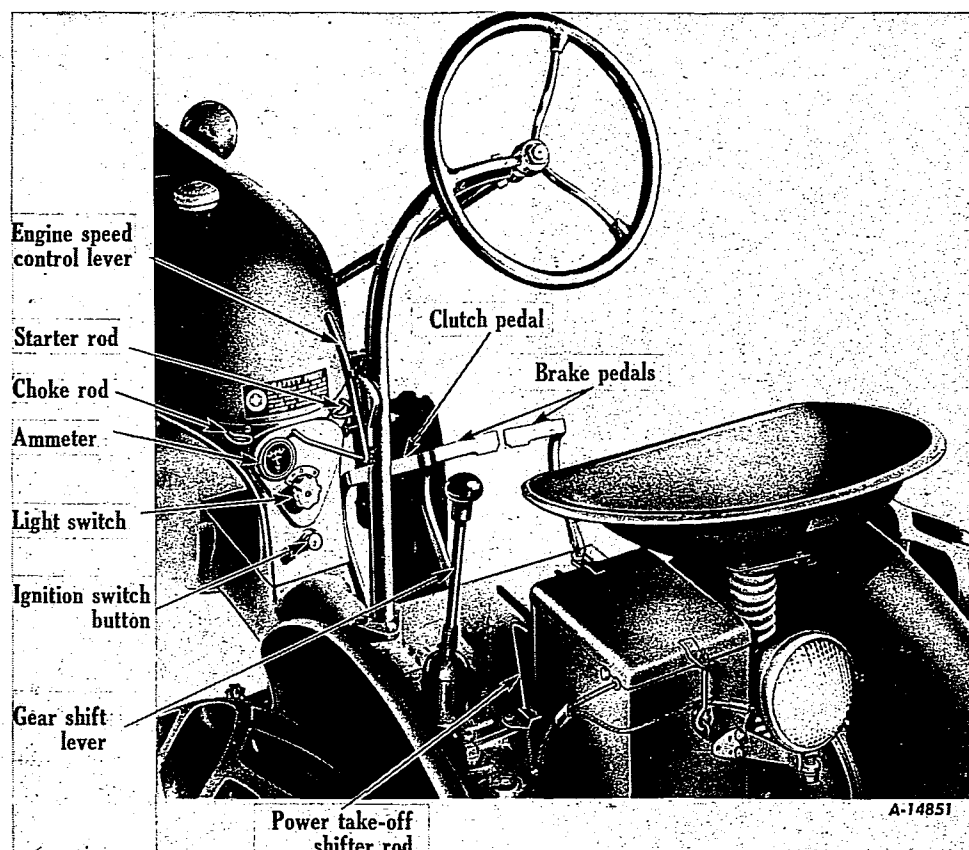
Right Front View of the Farmall Cub. The Adjustable Front Axle and Electric Starting and Lighting shown in this Illustration are Special Features.



A-14909

Left Front View of the Farmall Cub.

FARMALL CUB



Illust. 3—Location of Controls.

Instruments and Controls

The belt pulley, power take-off, adjustable front axle, and starting and lighting attachments are special equipment on the Farmall Cub, and are only furnished when ordered. However, the instructions for operating and maintaining these attachments have been incorporated into the instructions for operating and maintaining the tractor. If your tractor does not have these special features the instructions for their operation may be disregarded.

Brake Pedals

These pedals are used to stop the tractor, to hold the tractor in a stationary position, or to assist in making sharp turns as outlined below:

To stop the tractor, latch the pedals together so both brakes will operate simultaneously when the pedals are pressed down.

To hold the tractor in a stationary position, latch the pedals together, depress and lock them in this depressed position by using the brake pedal lock.

To assist in making a sharp turn, the pedals must be operated individually, de-

pressing the pedal on the side toward which the turn is to be made.

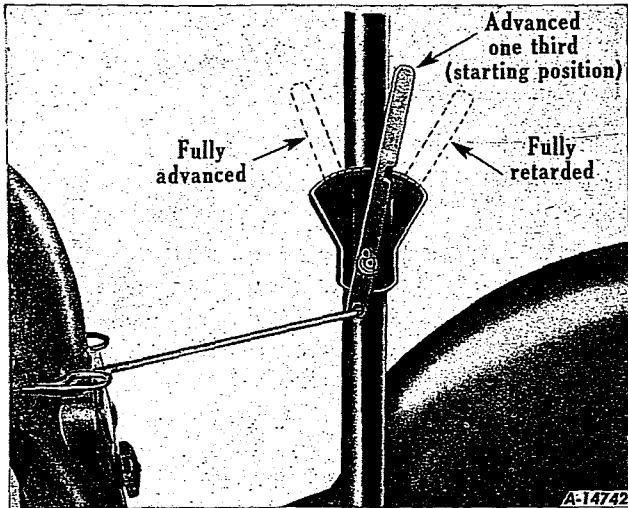
The brake pedal latch (located behind the left-hand brake pedal), is used to latch both brake pedals together, causing the brakes to operate simultaneously.

The brake pedal lock, *Illusts. 3 and 77*, is used to lock the brake pedals in the depressed position which prevents the tractor from moving.

Clutch Pedal

This pedal, when depressed all the way, disengages the engine from the transmission.

DESCRIPTION



Illust. 4—Various Positions of the Engine Speed Control Lever.

Engine Speed Control Lever

This lever controls the speed of the engine and, when set in a given position, will maintain a uniform engine speed even though the engine load may vary.

The rated or maximum full load governed speed is 1600 r.p.m.; maximum idle speed is approximately 1800 r.p.m.; minimum speed (hand throttle) is 450 to 500 r.p.m. Never operate the engine at more than the regular governed speed. Excessive speeds are harmful.

The governor is set at the factory and should require no adjustment. Consult your International Harvester dealer if the governor does not function properly.

Choke Rod

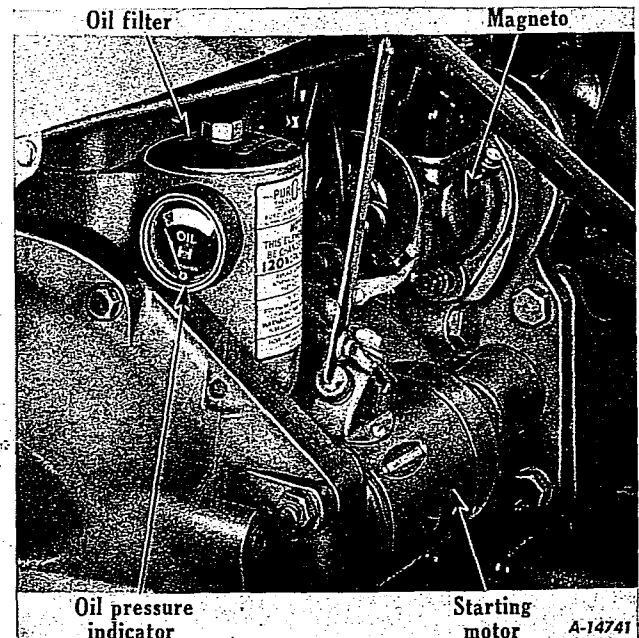
The choke rod is a part of the electric starting attachment, and makes possible the regulation of the carburetor choke from the driver's seat. Pulling out on the choke rod closes the carburetor choke for starting the engine; pushing it back in opens the choke.

Carburetor Choke Lever

The carburetor choke lever controls the air supply to the carburetor. When the choke lever, *Illusts. 10 and 14*, is moved up all the way (closed position) the air supply is cut off, thereby enriching the fuel mixture for starting the engine. If your tractor is not equipped with the electric starter and choke rod, move the choke lever up all the way before cranking the engine. Moving the choke lever back down opens the choke for normal engine operation.

Ignition Switch Button

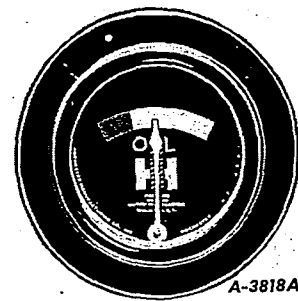
This button closes and opens the electrical circuit for starting and stopping the engine. Pull the button out for starting, and push it in to stop the engine.



Illust. 5—Location of Oil Pressure Indicator.

Oil Pressure Indicator

This gauge, *Illusts. 5 and 6*, shows whether lubricating oil is circulating through the engine. The indicator needle should be in the white area when the engine is running, *Illust. 6*. If it is not in the white area, stop the engine immediately and investigate the cause of the oil pressure failure. If you are unable to find cause, be sure to consult your International Harvester dealer before operating the engine.

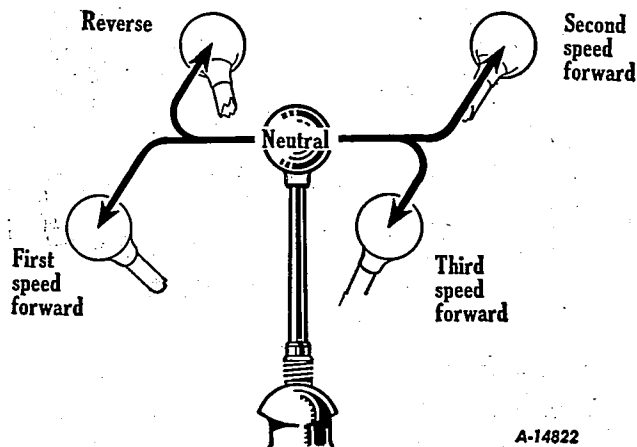


Illust. 6—Oil Pressure Indicator, Showing Needle in Correct Operating Position.

FARMALL CUB

Gearshift Lever

This lever is used to select various gear ratios provided in the transmission. There are three (3) forward speeds and one (1) reverse speed, *Illust. 7.*



Illust. 7—Gear Shifting Positions.

Starter Rod

The starter rod is used to start and stop the starting motor. To crank the engine, pull out on the starter rod.

Light Switch

This switch operates the lights and is also used to manually control the generator output.

The switch has four positions; "L" low charge; "H" high charge; "D" dim lights; and "B" bright lights.

Ammeter

This instrument indicates the charging rate of the generator or discharge rate of the battery. The ammeter should show charge whenever the engine is running. If it shows discharge continuously, investigate the cause to avoid completely discharging the battery and possible damage to the generator. *Refer to pages 32 to 38 for additional information on electrical equipment.*

Belt Pulley and Power Take-Off Control Rod

The shifter rod is used to engage or disengage the belt pulley or the power take-off. *Refer to page 13 for operating instructions.*

Make a complete inspection of the tractor for any shortages or damage which may have occurred during shipment.

Before Starting Your New Tractor

Lubrication

Lubricate the entire tractor, using the "Lubrication Chart," *page 18*, as a guide.

Check the oil levels of the engine crankcase, air cleaner, transmission, belt pulley housing and all gear cases, to see that they are filled to the correct levels with the proper grades of oil for the prevailing temperature, *refer to "Lubrication Chart" and the "Specifications of Lubricants" on page 17.*

Tractors shipped to destinations in the United States of America, Canada and Mexico are filled with oil in all parts before leaving the factory. Engines are filled with a light engine oil.

Tractors packed for export have all oil drained from the engine crankcase, air cleaner and all gear cases.

Before starting the engine, for the first time, remove the spark plugs and put about one teaspoonful of crankcase oil into each cylinder; replace the spark plugs and crank the engine to distribute the oil over the cylinder walls. This assures positive lubrication of the cylinders and pistons immediately after starting and eliminates the possibility of scoring.

Pneumatic Tires

Before moving the tractor, check the air pressure in the pneumatic tires and inflate or deflate the front tires to 20 lbs. and the rear tires to 12 lbs. *Refer to chart on page 47 for more complete information.*

Engine Cooling System

The cooling system capacity is approximately $9\frac{3}{4}$ U.S. quarts.

Be sure the drain plug underneath the radiator is closed, *Illust. 45.*

Fill the radiator to a level slightly below the bottom of the filler neck. Filling the radiator to this level will allow for expansion of the coolant under normal operating conditions. Use clean water; soft or rain water is recommended as it does not contain alkali which forms scale and eventually clogs the passages.

For further information see "Cooling System," *page 26.* If the tractor is to be operated in freezing temperatures (32°F or lower) *refer to "Cold Weather Precautions," page 25.*

DESCRIPTION

Fuel System

Use a good grade of clean gasoline.

During the first 100 hours of operation, mix 1 pint of light engine oil with every 5 U.S. gallons of fuel.

Ignition

Check to see that the magneto "coil distributor" cable "B," *Illust. 57*, is secured in its socket on the magneto coil cover.

Tractors shipped from the factory with starting and lighting equipment have the "battery to ground" cable, *Illust. 62*, and the cable leading to the "F" terminal on the generator, *Illust. 59*, disconnected. Therefore, before attempting to start the engine, be sure that the "battery to ground" cable and the generator cable are connected to their correct terminals.

How to Prepare Your Tractor for Each Day's Work

Fuel System

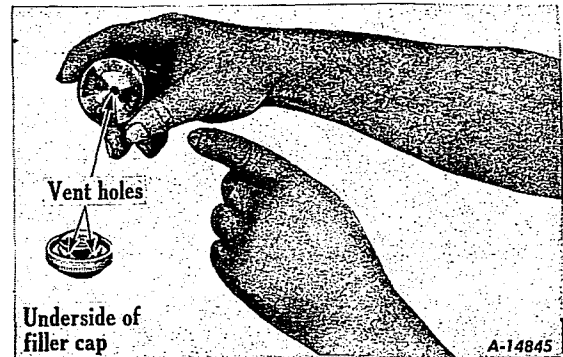
Fill the fuel tank (capacity $7\frac{1}{2}$ gals.) with a good grade of clean gasoline, preferably at the end of each day's run. This will force out any moisture-laden air and prevent condensation in the fuel tank.

Safety First! Never fill the fuel tank when the engine is running or when near an open flame, do not smoke or use an oil lantern when working around inflammable fuels. When pouring fuel, keep the funnel and container in contact with the metal of the fuel tank, *Illust. 8*, to avoid the possibility of an electric spark igniting the gas. Do not light matches near gasoline as the air within a radius of several feet is mixed with a highly explosive vapor.



Illust. 8—Filling the Fuel Tank.

The fuel tank filler cap has air vents, *Illust. 9*. Keep these vents open at all times to assure proper flow of the fuel.



Illust. 9—Vent Holes in Filler Cap.

Cooling System

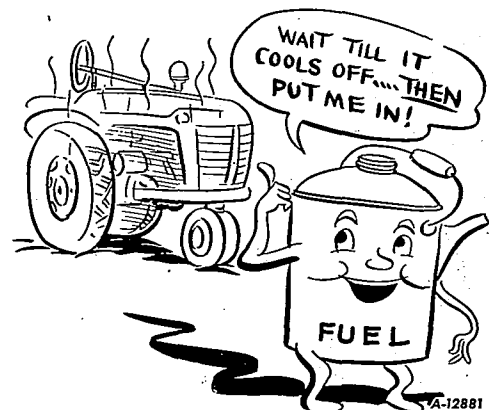
Remove the radiator filler cap and check the water level. Fill to a level slightly below the bottom of the filler neck.

Lubrication

Air Cleaner—Change the oil in the air cleaner oil cup. Fill to the level mark with engine oil. Remove any dirt or chaff from the air cleaner cap.

Engine crankcase—Check the oil level and, if necessary, add sufficient oil to bring the level up to the "FULL" mark on the bayonet gauge, *Illust. 18*, also refer to *lubrication guide*, page 19.

Grease fittings—Refer to "*Lubrication Guide*," pages 18 and 19, for complete daily lubrication requirements.



Never refuel tractor while engine is running or extremely hot.

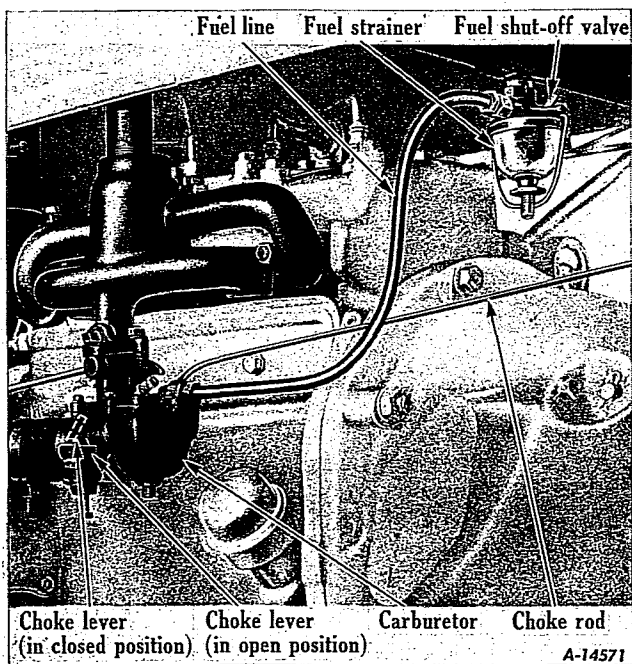
OPERATING YOUR TRACTOR

Before attempting to start or operate the tractor, be sure that you have checked over the instructions for a new tractor and thoroughly familiarized yourself with the instruments and controls.

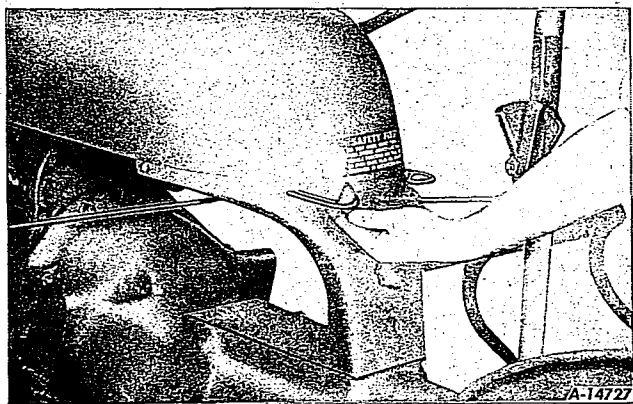
Operating the Engine

Fuel System

Check the fuel tank to make sure it is full; also see that the shut-off valve on the fuel strainer under the gasoline tank is open.



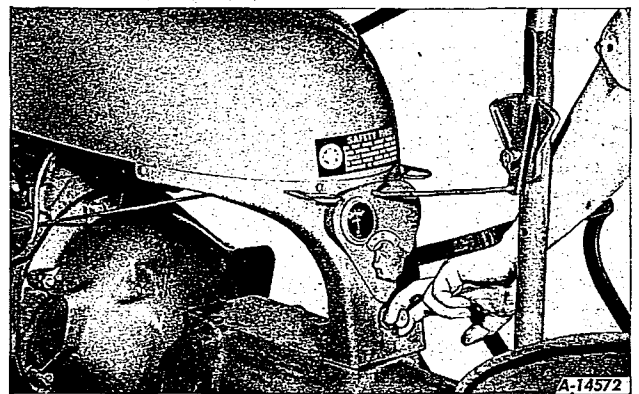
Illust. 10—Fuel System and Controls.



Illust. 11—Pulling out on the Choke Rod.



When starting the engine in a barn or garage, keep the doors wide open, as the exhaust gas contains deadly carbon monoxide, which is odorless, tasteless, and colorless.



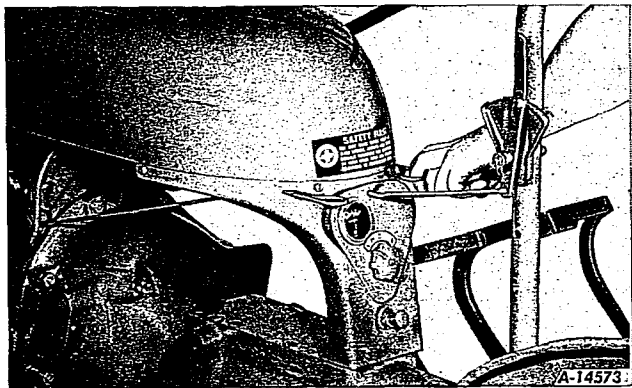
Illust. 12—Pulling out on the Ignition Switch Button.

Starting the Engine

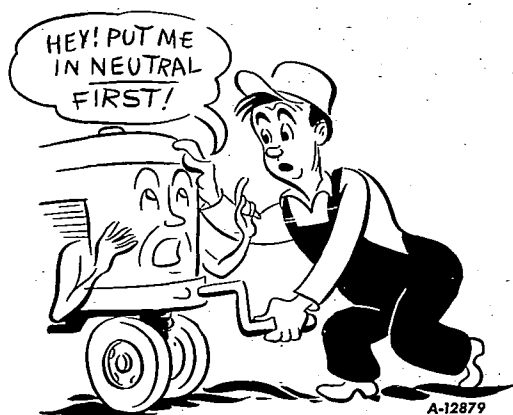
If your tractor is equipped with an electric starter:

1. Put the gearshift lever in neutral position, *Illust. 7.*
2. Pull the choke rod all the way out, *Illust. 11.*
3. Advance the engine speed control lever one-third, *Illust. 4.*
4. Pull out on the ignition switch button, *Illust. 12.*
5. Pull out on the starter rod, *Illust. 13,* and release as soon as the engine starts. However, do not hold the starter rod out for more than 30 seconds at any one time. If the engine does not start within this time, release the starter rod and wait a minute or two, then try again.

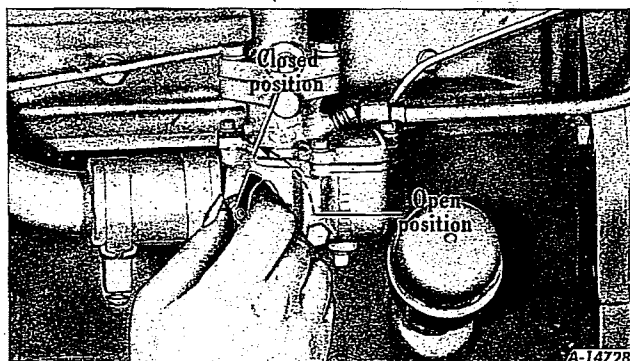
OPERATING YOUR TRACTOR



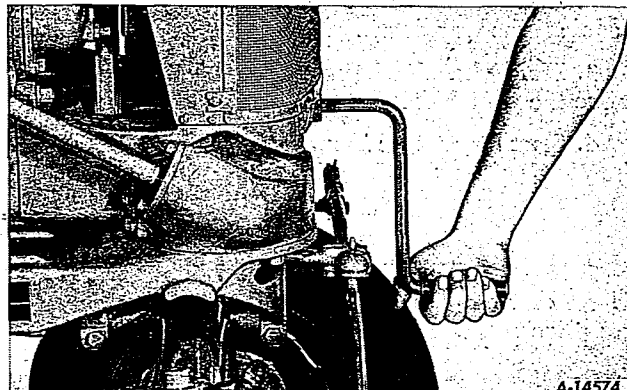
Illust. 13—Pulling out on the Starter Rod.



Be sure that the gearshift lever of the tractor is in neutral before starting the engine.



Illust. 14—Closing the Carburetor Choke Lever.



Illust. 15—Correct Method of Hand-Cranking.

If your tractor is not equipped with an electric starter:

1. Put the gearshift lever in neutral position, *Illust. 7.*
2. Close the choke by moving the carburetor choke lever all the way up, *Illust. 14.*
3. Advance the engine speed control lever one-third, *Illust. 4.*
4. Pull out on the ignition switch button, *Illust. 12.*
5. Crank the engine one or two strokes, then open the choke part way.
6. Crank the engine until it starts, *Illust. 15.*

Avoid over-choking as excessive use of the choke will flood the engine, making it hard to start. The use of the choke for starting will vary, depending on temperature and altitude.

Caution! When cranking the engine, be sure that the gearshift lever is in neutral position and always stand in a position that will eliminate any possibility of being struck by the starting crank if there is a reversal of the direction of the engine. Crank the engine by using quick up-strokes; do not spin it.

Careless use of the tractor and other farm machinery is the cause of most farm accidents. The safety rules shown throughout this manual are based on a careful study of thousands of farm accidents. . . . Study them carefully and follow them, and insist that they be followed by those working for you.

Remember, an accident is usually caused by someone's carelessness, neglect or oversight.

FARMALL CUB

After Engine Starts

As soon as the engine starts, adjust the choke to a point where the engine operates without missing; and as the engine warms up, open the choke by gradually pushing the choke rod all the way in, or by moving the carburetor choke lever down all the way, *Illusts. 10 and 16*. Do not use the choke to enrich the fuel mixture except when starting the engine.

Immediately after the engine starts, check oil pressure indicator, *Illust. 6*, to see whether sufficient oil is circulating through the engine. If it is not, stop the engine and inspect the oil system to find the cause of failure. If unable to find the cause, be sure to consult your International Harvester dealer before operating the engine.

Stopping the Engine

Retard the engine speed control lever by pulling it all the way back, *Illust. 4*, and push the ignition switch control button all the way in. It is advisable to close gasoline shut-off valve if the engine is to be stopped for any length of time.

Driving the Tractor

To Start the Tractor

1. Advance the engine speed control lever, *Illust. 4*.

2. Disengage the clutch by pressing the clutch pedal all the way down.

3. Hold the clutch pedal in this position and move the gearshift lever to the desired speed.

4. Start the tractor in motion by slowly releasing the clutch pedal. (Note: Do not shift gears while engine clutch is engaged or while the tractor is in motion.)

5. Do not "ride" the clutch or brake pedals while driving the tractor as this will result in excessive wear on the linings.

Always latch the brake pedals together before driving the tractor in high gear. To latch the pedals together, engage the latch "A" (located in back of left brake pedal) in the slot in back of the right pedal, *Illust. 77*. When brake pedals are not latched together the latch should rest in the slot in back of the left brake pedal, *Illust. 76*.

To Stop the Tractor

Disengage the clutch by pressing down firmly on the clutch pedal and move the gearshift lever to neutral position. Use the brakes if necessary.

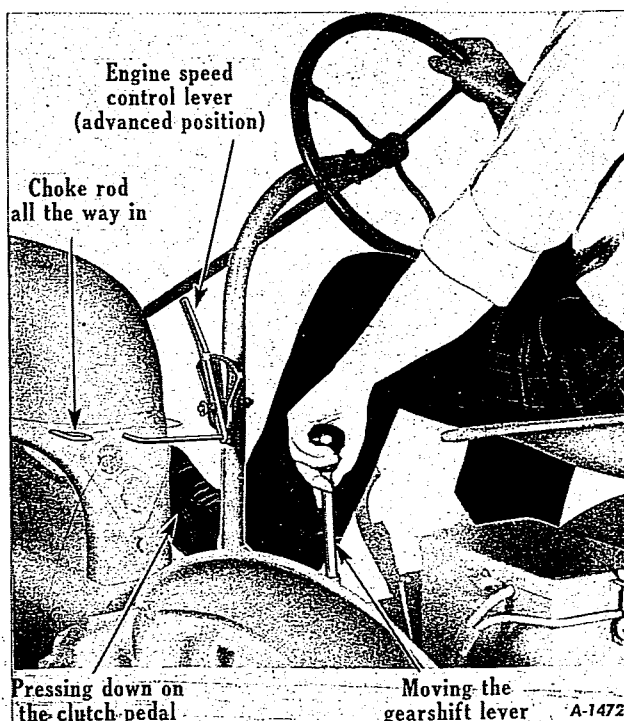
Locking Brakes

Always lock the brakes when tractor is parked on a grade or when doing belt work. To lock the brakes, first latch the brake pedals together with the latch as previously described. Now press down on the foot pedals, then place the brake pedal lock in the engaged position as shown in *Illust. 77*. To disengage the lock, press down on the foot pedals, lift the lock and place it in the disengaged position, against the right-hand brake pedal, *Illust. 76*.



A-14821

Always engage the clutch gently, especially when going up a hill or when pulling out of a ditch.



A-14724

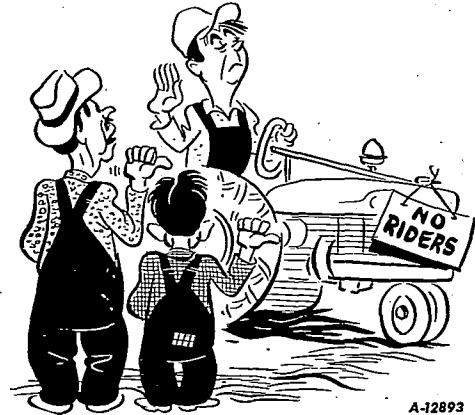
Illust. 16—Shifting the Gears.

OPERATING YOUR TRACTOR



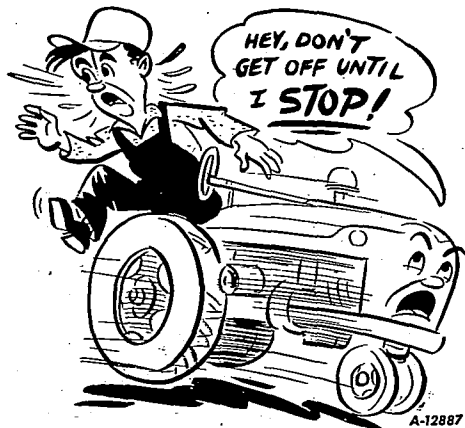
A-14820

Always lock the brake pedals together when driving on the highway or when driving in high gear.
Be sure that the brakes are properly adjusted.



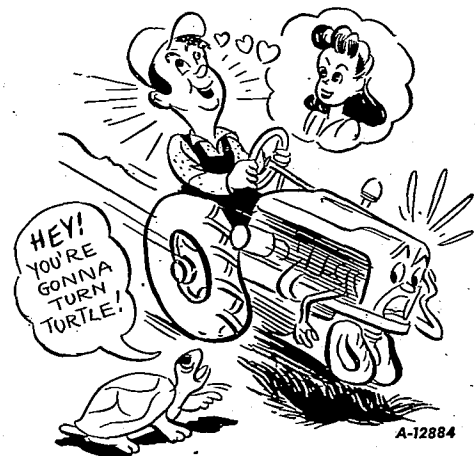
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Only one person, the operator, should be permitted to ride on the tractor when it is in operation.



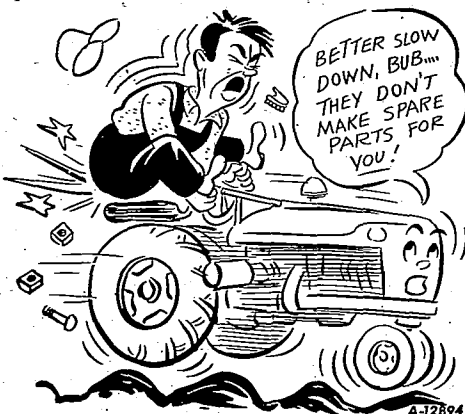
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Never dismount from the tractor while it is in motion. Wait until it stops.



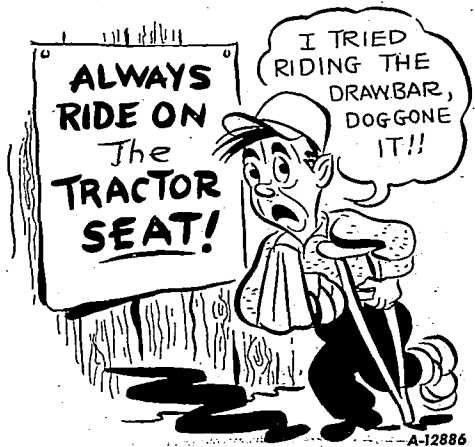
A-12884

Be extra careful when working on hillsides. Watch out for holes or ditches into which a wheel might drop and overturn the tractor.



A-12894

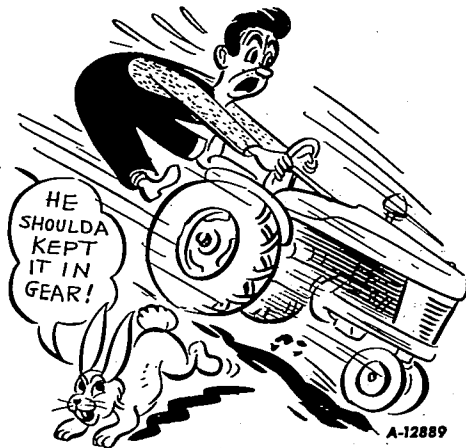
Always drive the tractor at speeds slow enough to insure safety, especially when driving over rough ground or near ditches.



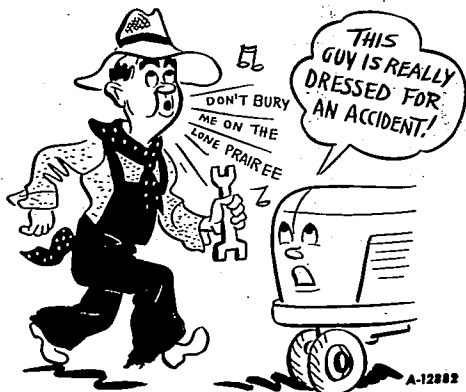
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Always ride on the tractor seat when driving on the highway or to and from the fields. Never ride on the tractor drawbar or on the drawn implement.

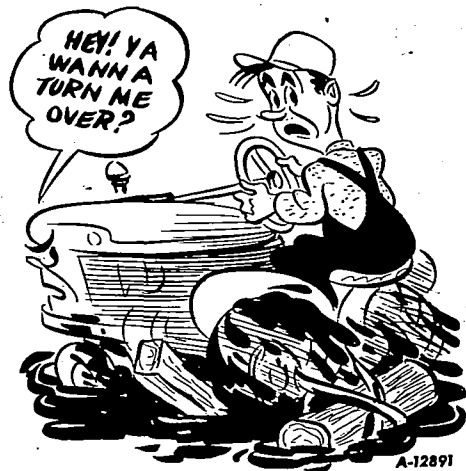
FARMALL CUB



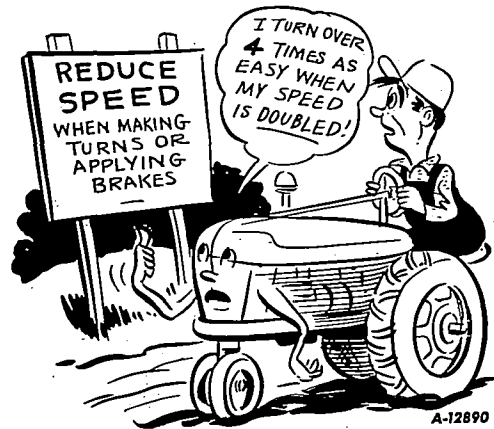
Always keep the tractor in gear when going down steep hills.



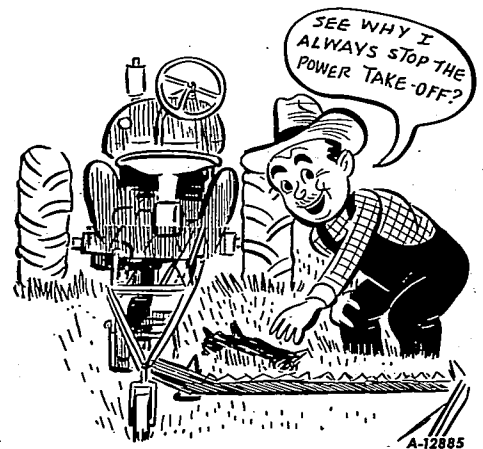
Loose or "floppy" clothing should not be worn by the operator because of the danger of it wrapping on or getting into the moving parts.



If the tractor will not move because the rear wheels have dug in or sunk deeply into the ground, don't fasten logs, posts, or anything to the rear wheels that will prevent them from rotating. This would be certain to tip the tractor over backward. Instead.....



Reduce speed before making a turn or when applying the brakes. Remember, the danger of the tractor overturning increases four times when the speed is doubled.

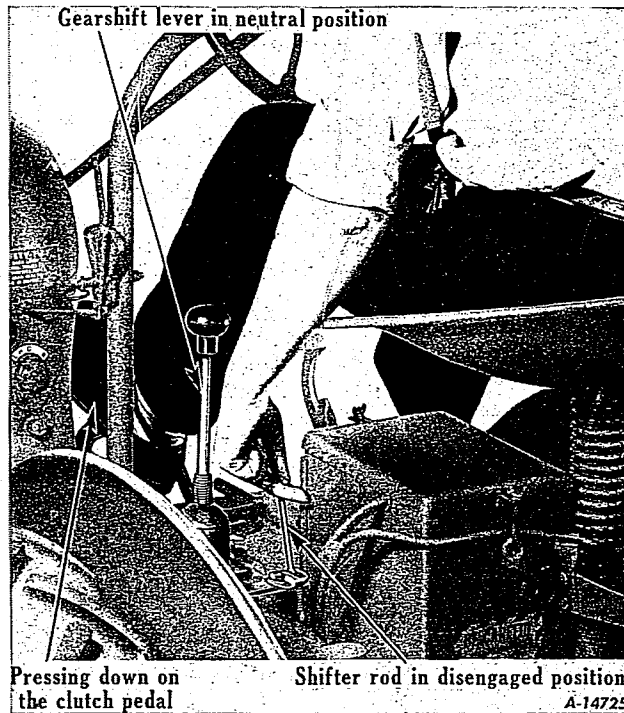


Always stop the power take-off before dismounting from the tractor.



.....dig out or jack up the rear wheels and fill in under them. Or, if another tractor is available, hitch it with a chain to the front end of the "stuck" tractor. The power of both tractors can be used, if needed, provided a heavy pull is kept on the chain all the time.

OPERATING YOUR TRACTOR



Illust. 17—Moving the Belt Pulley and Power Take-Off Shifter Rod to the Engaged Position.

Operating the Belt Pulley and Power Take-Off

If your tractor is equipped with a belt pulley or power take-off, the following instructions and precautions should be carefully studied and followed.

The belt pulley and power take-off are started and stopped by the same engine clutch as the tractor. Be sure to disengage the engine clutch before moving the belt pulley or power take-off shifter rod. The belt pulley is driven by the power take-off shaft; therefore, the same shifter rod is used to operate either the belt pulley or power take-off. The shifter rod should always be in the disengaged (forward) position, *Illust. 17*, when the belt pulley or power take-off are not in use.

Operating the Belt Pulley or Power Take-Off with the Tractor Standing Still

1. The transmission gearshift lever must be in neutral position.
2. Move the engine speed control lever back, to low idle speed.

3. Depress the clutch pedal to disengage the engine clutch.

4. Press down on the shifter rod, *Illust. 17*, and move it back to the engaged position; release the shifter rod and allow it to lock in place.

5. Slowly release the clutch pedal.

Operating the Power Take-Off with Tractor in Motion

Follow the first four steps outlined above, then release the power take-off shifter rod and allow it to lock in place. Keep your foot pressed down on the clutch pedal (in the disengaged position), advance the engine speed control lever and move the transmission gearshift lever to the speed that is desired to run the tractor. Slowly release the clutch pedal, which will start the tractor in motion with the power take-off in operation.

When the power take-off shaft is not in use, always keep it covered with the power take-off shaft guard.

For additional belt pulley and power take-off information, refer to page 55.

LUBRICATION

The life of any tractor depends upon the care it is given. Proper lubrication is a very important part of that care.

General Engine Lubrication

The engine has a pressure-feed lubrication system. A gear-type oil pump circulates the lubricating oil under pressure to the crankshaft bearings, connecting-rod bearings, camshaft bearings, valve mechanism, timing gears, and governor, thereby assuring positive lubrication of all parts.

Oil Pump

The gear oil pump in the crankcase has a screen attached to the oil intake which stops large dirt particles from entering the oiling system. Clean this screen whenever the oil pan is removed.

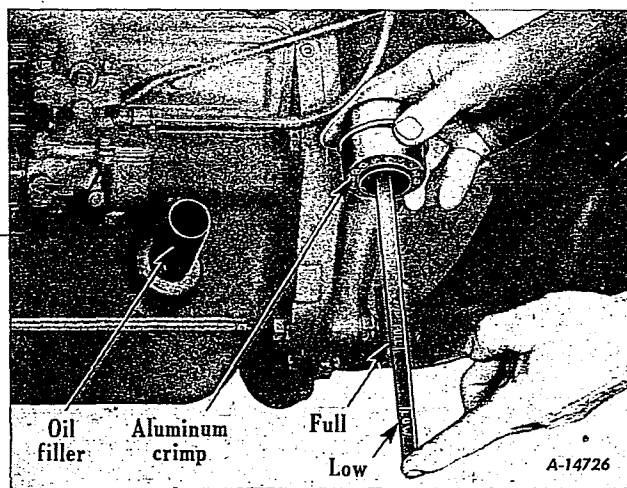
Oil Pressure Indicator

The oil pressure indicator shows whether the oil pump is working. Under all operating conditions, the oil pressure should hold the indicator in the white section of the gauge. Should the indicator not register, stop the engine at once and inspect the oil system to find the cause of failure. If unable to find the cause, consult your International Harvester dealer before operating the engine.

Always look at the oil pressure indicator immediately after starting the engine.

Crankcase Breather

The crankcase breather and oil filler cap, *Illust. 18*, has an oiled aluminum crimp filler which acts as a dust filter for crankcase ventilation. Clean and recoil this breather each time the engine oil is changed.



Illust. 18—Checking the Oil Level in the Crankcase.

Oil Filter

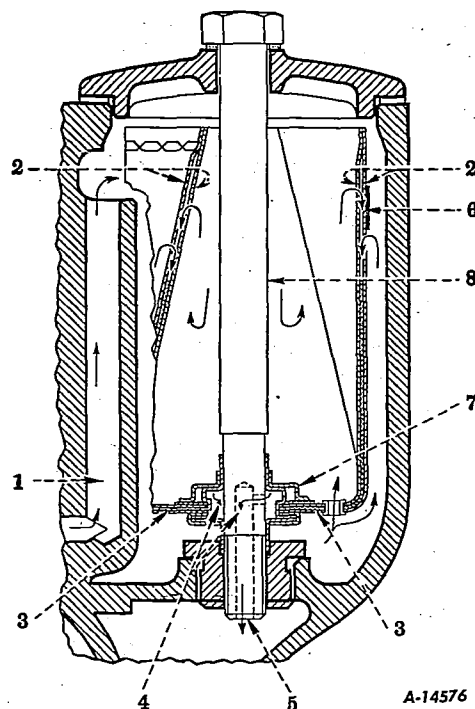
The engine is equipped with an oil filter which continually cleans the oil while the engine is running. To obtain the full benefit from the filter, replace the used element with a new one every time the oil is changed in the crankcase (after every 120 hours of operation). Cleaning the old element is not satisfactory.

Do not run the engine for any length of time with the oil level below the low mark on gauge, *Illust. 18*.

Never check the oil level while the engine is operating.

Oil Filter

The life of your engine depends upon clean oil being circulated to all bearings. Every good tractor operator knows that dirt and other injurious materials eventually get into the crankcase of the engine, and that in the normal course of engine



Illust. 19—Cutaway view of filter showing: (1) oil inlet; (2) replaceable filtering element; (3) mesh screen separator to provide passage for filtered oil between inner and outer layer of element; (4) outlet for filtered oil; (5) filtered oil return; (6) band holding folds of element together; (7) oil seal; (8) stud.

LUBRICATION

operation, the lubricating oil undergoes changes which produce sludge, acids, gums, varnish, and other harmful byproducts.

The purpose of the oil filter is to separate and remove the dirt and other foreign substances from the oil to prevent these injurious materials from being circulated to the engine.

This filter is so efficient it will keep the circulating oil free of harmful materials for 120 hours of operation—at which time the oil should be changed and the inexpensive filter element replaced. Refer to "Lubrication Chart" for the recommended oil to use for the prevailing temperature. By following the simple, common-sense procedure for keeping dirt and oil impurities away from precision-made engine parts, you will safe guard your tractor engine against undue wear and the operating troubles and upkeep expense which are a natural result of that condition.

To Change Filter Element

1. Do not change the element while the engine is running.

2. Remove the oil filter drain pipe cap, *Illust. 20*, and allow the oil filter to drain completely.

3. Clean off the filter cover "A," *Illust. 21*, to prevent dirt from dropping into the filter when the cover is removed.

4. Unscrew and remove the stud "B" and gasket "C," *Illust. 21*.

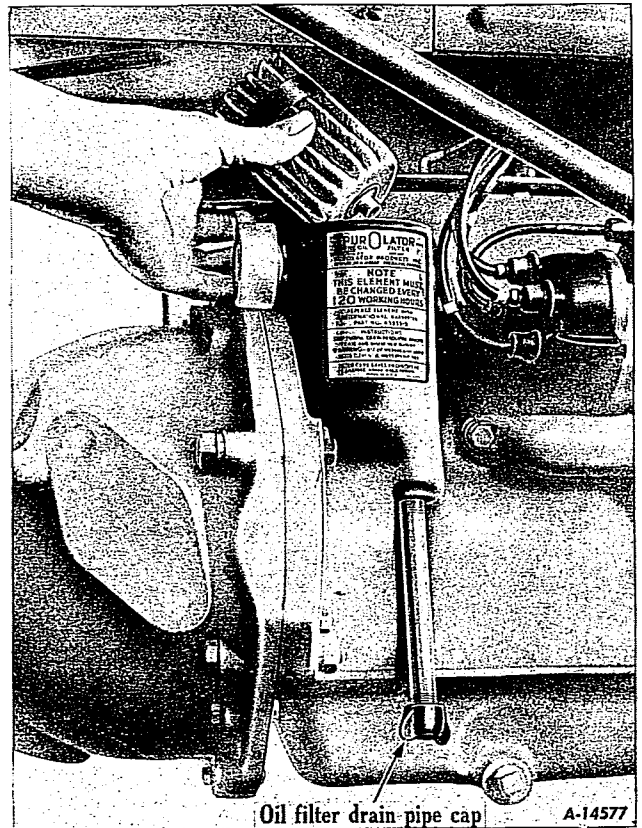
5. Lift up and remove the filter cover "A" and gasket "D," *Illust. 21*.

6. Remove the old element.

7. If the oil appears very dirty or sludgy when draining, flush out the filter with kerosene. Before flushing however, replace the stud without the filter cover in order to prevent sludge from being flushed into the crankcase. When completely flushed and drained, replace the drain pipe cap.

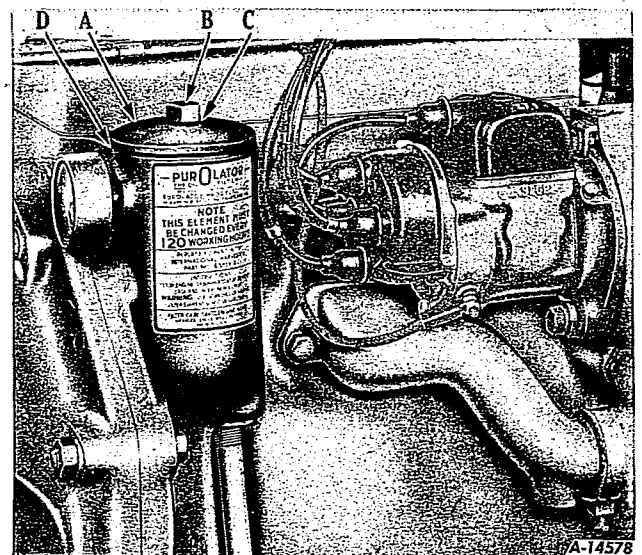
8. To install the new filter element move the gasket "C" up to the top of the stud "B" and place the cover "A," gasket "D" and the new element on the stud in their proper order, *Illust. 21*. (Leave the retaining band on the element.) Then install the entire assembly and be sure that the filter cover gasket "D" seats properly. Screw the stud into the filter base and tighten securely.

9. Check the oil level in the crankcase to see that the new oil is up to the proper level (See "Lubrication Chart"). Now start up the engine, check the oil pressure indicator to see whether sufficient oil is circulating through the engine, and inspect the filter for oil leaks.



Illust. 20—Installing the New Oil Filter Element.

Note: To avoid delays, we recommend that you carry extra elements on hand so replacement can be made at the proper time.



Illust. 21—Oil Filter Assembled.

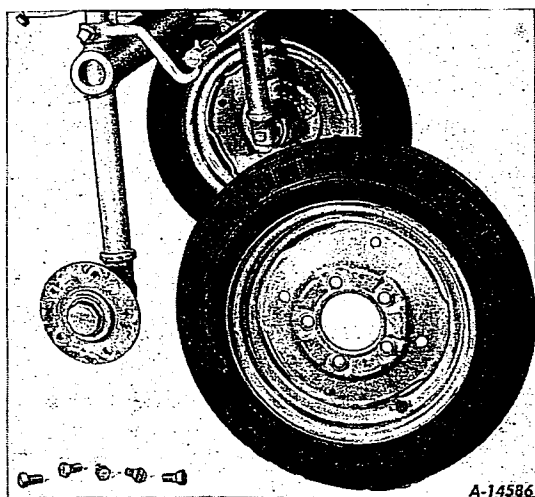
FARMALL CUB

Greasing Front Wheels

Removing and Greasing

After every six months of operation remove and grease the front wheels.

To grease the front wheels, raise the front end of the tractor until the wheel clears the ground and remove the wheel as shown in *Illust. 22*. Unscrew hub cap "A," *Illust. 23*, remove cotter pin, remove nut "B" and washer "C." Remove bearing "D" and place it in hub cap "A" or a clean container; then remove and clean the inside of hub "E."

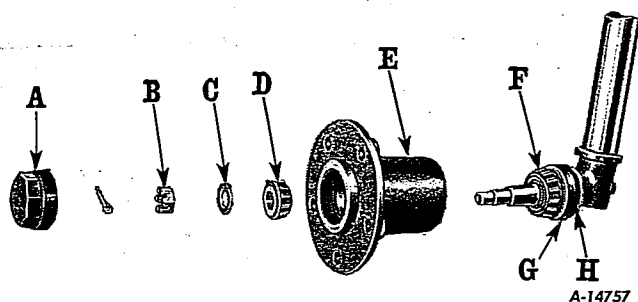


Illust. 22—Front Wheel Removed from Hub.

Remove old grease from bearings and clean them thoroughly with kerosene. Then pack the bearings with pressure-gun grease (chassis lubricant).

It is advisable to leave bearing "F" on the axle and clean it with a brush and kerosene. Apply new grease on rollers before reassembling the bearings.

Inspect the oil seal "G" and felt washer "H"



Illust. 23—Front Wheel Hub and Bearing Removed for Cleaning.

and if they are not in satisfactory condition, replace them with new ones.

Replacing and Adjusting

Reassemble hub and wheel, tighten nut "B" until the wheel binds slightly, rotating wheel at the same time. Back the nut off one castellation from the cotter pin hole; replace cotter pin and hub cap.

Be sure to keep all parts clean.

Lubricating Oil and Grease Specifications

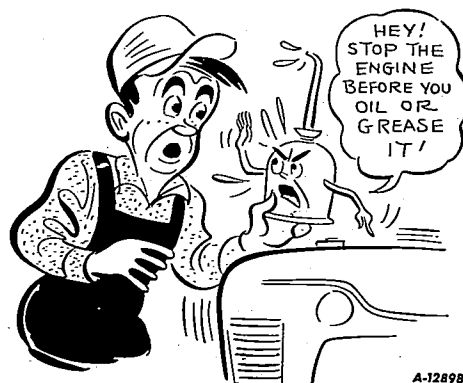
Engine Oil

Engine lubricating oil should be of well-refined petroleum oils, free from water, sediment, and without admixtures of fatty oils, acids, soaps, resins or any other substance not derived from petroleum. Oil shall not corrode any metal used in engine construction. Also engine lubricating oil containing additive products not necessarily derived from petroleum, but being of non-corrosive type, is satisfactory for use in our engine.

To Aid Starting

To aid easier starting, the selection of crankcase lubricating oils should be based on the lowest anticipated temperature for the day. It is not necessary to change the crankcase oil every time the temperature rises or falls into another temperature range during some part of the 24-hour day.

Also refer to special instructions for Cold Weather Operation on page 25.



Don't oil or grease the tractor while the engine is running.

LUBRICATION

Gear Lubricant

Tractors are shipped from the factory with SAE-90 oil in the transmission, steering gear, rear axle and belt pulley housings.

For all temperatures above zero, use SAE-90 transmission lubricant. For temperatures below zero, use the same transmission lubricant as for above zero, except to dilute with kerosene as follows: pour $\frac{2}{3}$ U. S. pint of kerosene into the transmission case and $\frac{1}{3}$ U. S. pint of kerosene into each rear axle housing.

After the kerosene is put in these compartments, run the tractor until the mixture is thoroughly warm. Then drain to level plugs. Replace the plugs.

Use a good grade oil, free from solid materials. Use only high-quality lubricating oils and grease. For your own protection, select only oils and grease of recognized manufacture.

Keep your supply of lubricating oil absolutely clean and free from dust. Always use clean containers. Keep the lubricator clean and wipe dirt from grease fittings before applying lubricator.

Engine and Chassis Lubricant Specifications

Point of Lubrication	Capacity	Summer	Spring and Fall	Winter
		Above 80° F.	Above 32° F.	Below 32° F.
Engine Crankcase.....	3 qts.	SAE-30	SA-20	SAE-10W
Air Cleaner Donaldson Type..... United Type.....	$\frac{1}{2}$ pt. $\frac{3}{8}$ pt.	SAE-30	SAE-20	SAE-10W

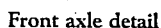
Point of Lubrication	Capacity	Anticipated Air Temperature		
		Above 32° F.	32° F. to 10°	Below 10° F.
Magneto Rotor Bearing..... Impulse Coupling.....	..... .....	SAE-30 *	SAE-20 *	SAE-10W *
Generator.....	.....	SAE-20	SAE-20	SAE-20
Starting motor.....	.....	None	None	None
Transmission.....	3 $\frac{1}{2}$ pt.	SAE-90	SAE-90	SAE-90†
Rear Axle Housing.....	2 pt. ea.	SAE-90	SAE-90	SAE-90†
Steering Gear.....	$\frac{3}{4}$ pt.	SAE-90	SAE-90	SAE-90
Belt Pulley Housing.....	$\frac{1}{3}$ pt.	SAE-90	SAE-90	SAE-90
Grease Fittings††.....	.....	Chassis Lubricant	Chassis Lubricant	Chassis Lubricant

*Impulse Coupling: Use a very light oil such as cream separator or sewing machine oil for all temperatures above 32° F. Use kerosene for temperatures below 32° F. Refer to page 31 for further information.

†Refer to "Gear Lubricant", page 17, for diluting with kerosene in cold weather.

††Use pressure-gun grease (chassis lubricant) for fitting on which hand lubricator is applied, for all temperatures.

Lubrication Guide



B-3044



FA-14744

A-14745

Illust. 26—Front Axle.

LUBRICATION

Key to Lubrication Guide

The symbols shown around the reference numbers on the lubrication chart on *page 18* indicate the intervals of lubrication.

Paragraph numbers on the left-hand side of the lubrication guide correspond with reference numbers on the lubrication chart.

Detail specifications of the lubricants are listed on *page 17*.

△—Daily or After Every 10 Hours of Operation

1—Crankcase oil level gauge and filler cap.

Check the oil level (with engine stopped) and add sufficient new oil to bring to "FULL" mark on bayonet gauge, *Illust. 18*. If the oil level is checked after the engine has been stopped for some time, the oil level may show slightly above the "FULL" mark on the gauge. This is a normal condition as the result of the oil draining back from the filter. *Refer to Illust. 24*.

2—Air cleaner.

Clean out the oil cup and refill the cup to oil level bead with same new oil as used in the engine crankcase, *Illust. 49*. Capacity (Donaldson type— $\frac{1}{2}$ pt.) *Refer to Illust. 25*. (United type— $\frac{3}{8}$ pt.)

3—Steering knuckle post (2).

4—Tie rod (2).

5—Tie rod ball seat.

6—Front axle pivot shaft.

Use pressure-gun grease (chassis lubricant) and apply 2 or 3 strokes of lubricator or sufficient grease to flush out old grease and dirt. Lubrication points are the same for both fixed and adjustable front axles. *Refer to Illust. 26*.

7—Steering shaft support bracket.

Use an oil can and put a few drops of engine oil in the oil hole. *Refer to Illust. 27*.

○—Weekly or After Every 60 Hours of Operation

8—Generator oil cups (2).

Insert the oil can spout through holes in the hood above each oil cup. Lift up cap on oil cup and apply 8 to 10 drops of SAE-20 oil in each cup. *Refer to Illust. 28*.

9—Fan hub.

Turn the fan hub so that the oil retainer screw (9) is to the right-hand horizontal position. Remove the screw and fill hub to the level of the filler hole opening with engine oil. Now turn the fan hub so that the oil filler hole is on the bottom, to allow excess oil to drain off. Replace oil retainer screw. *Refer to page 28 for more information. Refer to Illust. 29*.

10—Seat spring.

Use an oil can and put a few drops of engine oil in the oil hole (10). *Refer to Illust. 30*.

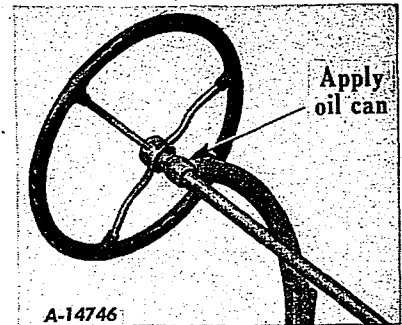
Miscellaneous parts.

Lubricate clutch and brake pedal connections with a few drops of engine oil.

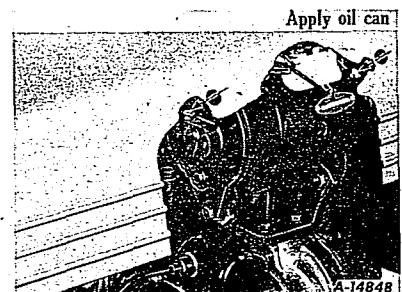
◇—After 120 Hours of Operation

11—Crankcase oil pan.

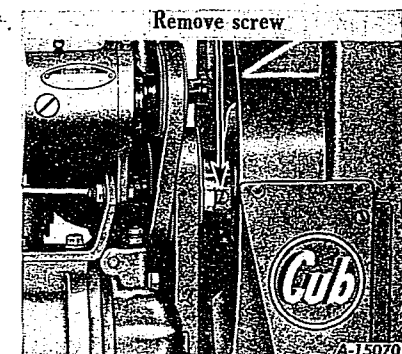
Drain while oil is warm. Remove the drain plug (11) and drain all oil from the crankcase pan, *Illust. 31*. Replace the drain plug. Remove the crankcase filler cap (1). Refill the crankcase pan with new oil up to the "FULL" mark on the bayonet gauge. Capacity 3 quarts.



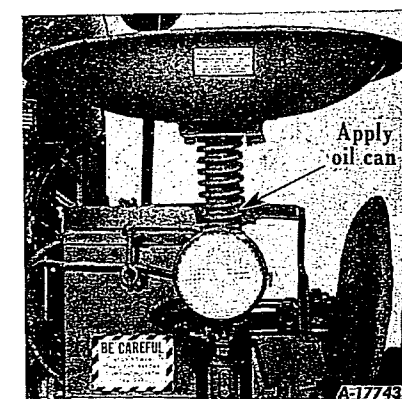
Illust. 27—Steering Shaft Support Bracket.



Illust. 28—Generator.

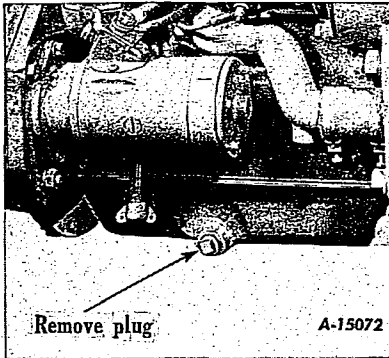


Illust. 29—Fan Hub.



Illust. 30—Seat Spring.

FARMALL CUB



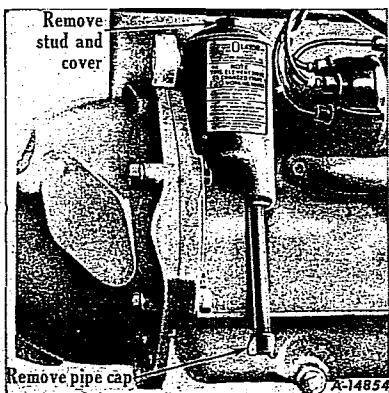
Illust. 31—Crankcase Drain Plug.

- 12—Oil filter drain.
- 13—Oil filter element.

Replace the oil filter element every time the crankcase oil is changed, *Illust. 32*. Remove the pipe cap (12) and allow all the oil to drain out. Remove oil filter stud (13) and filter cover and remove the used filter element. If oil appears very dirty or sludgy when draining, flush out the filter with kerosene. Before flushing however, replace the stud (13) without the filter cover in order to prevent sludge from being flushed into the crankcase. Replace drain cap (12) and install new filter element as instructed on *page 15*.

Use pressure-gun grease (chassis lube) and apply 2 or 3 strokes of the lubricator, *Illust. 33*.

- 14—Power take-off shaft.



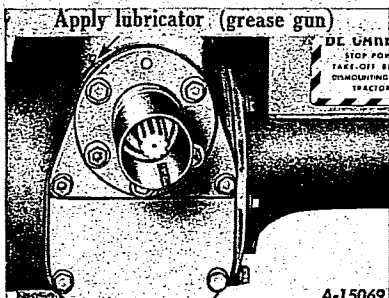
Illust. 32—Oil Filter.

Transmission

- 15—Oil filler plug.
- 16—Oil level plug.
- 17—Oil drain plug.

Check the oil level periodically. Use approved lubricant, *page 17*, and keep lubricant up to level plug (16) on left side of transmission case, *Illust. 37*. Change the oil in the transmission case at least once a year. However, do not drive the tractor more than 1000 hours without changing the oil. Remove the drain plug (17) and allow all the oil to drain out, *Illust. 38*. Replace the drain plug and remove the filler plug (15) and level plug (16). Refill with approved lubricant up to the level plug opening and replace plugs, *Illusts. 36 and 37*. If the oil in the transmission case has been thinned with kerosene for operating in temperatures below zero, change the oil before operating in warm weather. Capacity $3\frac{1}{2}$ pints.

○—Periodical

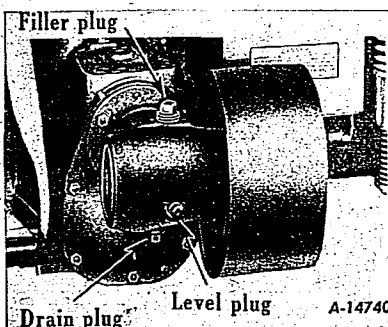


Illust. 33—Power Take-Off.

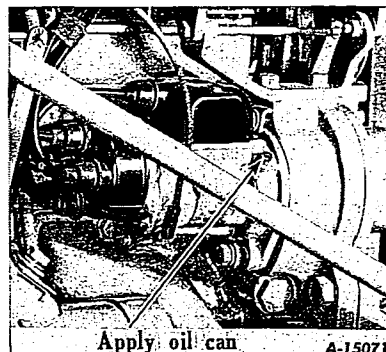
Belt Pulley Housing

- 18—Filler plug.
- 19—Level plug.
- 20—Drain plug.

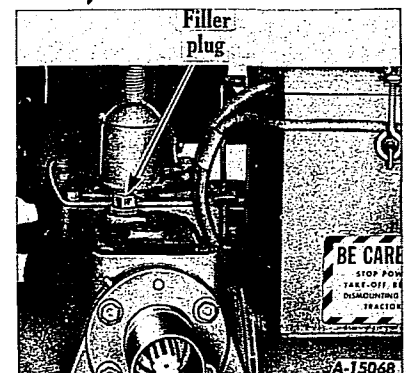
Check the oil level periodically. Use approved lubricant, *page 17*, and keep lubricant up to level plug (19). Drain and refill housing each time the oil is changed in the transmission case. To change the oil, remove the drain plug (20) and allow all the oil to drain out. Then replace the drain plug. Remove the filler plug (18) and the level plug (19). Fill up to oil level plug opening and replace plugs. Refer to *Illust. 34*. Capacity $\frac{1}{3}$ pint.



Illust. 34—Belt Pulley.



Illust. 35—Magneto.



Illust. 36—Transmission Filler Plug

LUBRICATION

Rear Axle Housing

21—Oil filler and level plug (2).

22—Oil pan (2).

Check the oil level periodically. Use approved lubricant, *page 17*, and keep lubricant up to level plug (21) in each rear axle housing, *Illust. 39*. Remove the drawbar to get at the level plug in the left-hand housing. Change the oil at least once a year. However, do not drive the tractor more than 1000 hours without changing the oil. To drain, remove the rear axle housing pan (22.) Clean the pan and replace it. Remove plug (21) and fill up to this level with approved lubricant. Replace plug. Capacity 2 pints each housing.

23—Magnet

After every 500 hours of operation, fill the rotor bearing oil cup (23) once with same oil as used in engine crankcase, *Illust. 35*. Refer to *page 30* for more information.

Steering Gear Housing

24—Filler plug.

25—Level plug.

26—Drain plug.

Check periodically and add sufficient approved lubricant, *page 17*, to level of plug (25). Change the oil at least once every year. However do not drive the tractor more than 1000 hours without changing the oil. Drain by removing drain plug (26) and refill with new lubricant. To fill remove filler plug (24) and level plug (25) and fill with approved lubricant to the level plug opening. Replace plugs. Refer to *Illust. 40*. Capacity, $\frac{3}{4}$ pint.

27—Front wheels.

Once every 6 months, remove, clean and repack front wheel bearings with pressure-gun grease (chassis lubricant). Refer to *page 16* for more information.

28—Clutch release bearing.

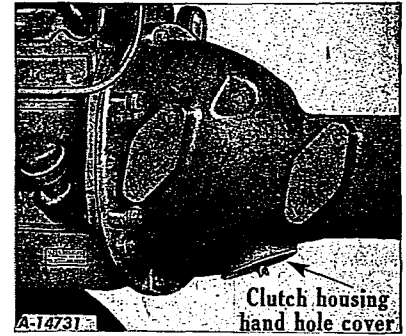
Use pressure-gun grease (chassis lubricant). After every 1000 hours or at least once every year apply a few strokes of the lubricator to the clutch release bearing fitting (28) or just enough grease until it starts to come out of the bleeder hole on top of the bearing retainer. To reach the fitting, remove the clutch housing handhole cover "A". Refer to lubrication chart. Also refer to *Illust. 41*.

29—Clutch pilot bearing.

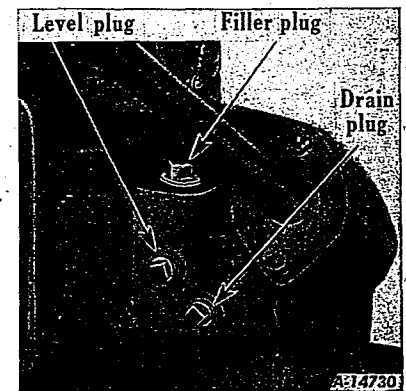
Does not require lubrication (oil-less bushing).

Miscellaneous Parts.

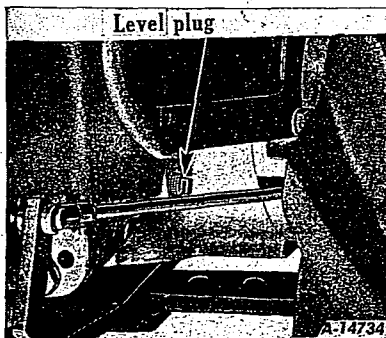
Occasionally put a few drops of engine oil on engine control linkage such as engine speed control rod, governor connections, etc.



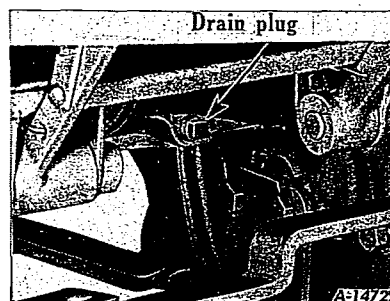
Illust. 41—Clutch Release Bearing.



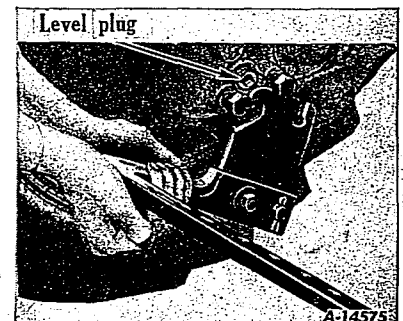
Illust. 40—Steering Gear Housing.



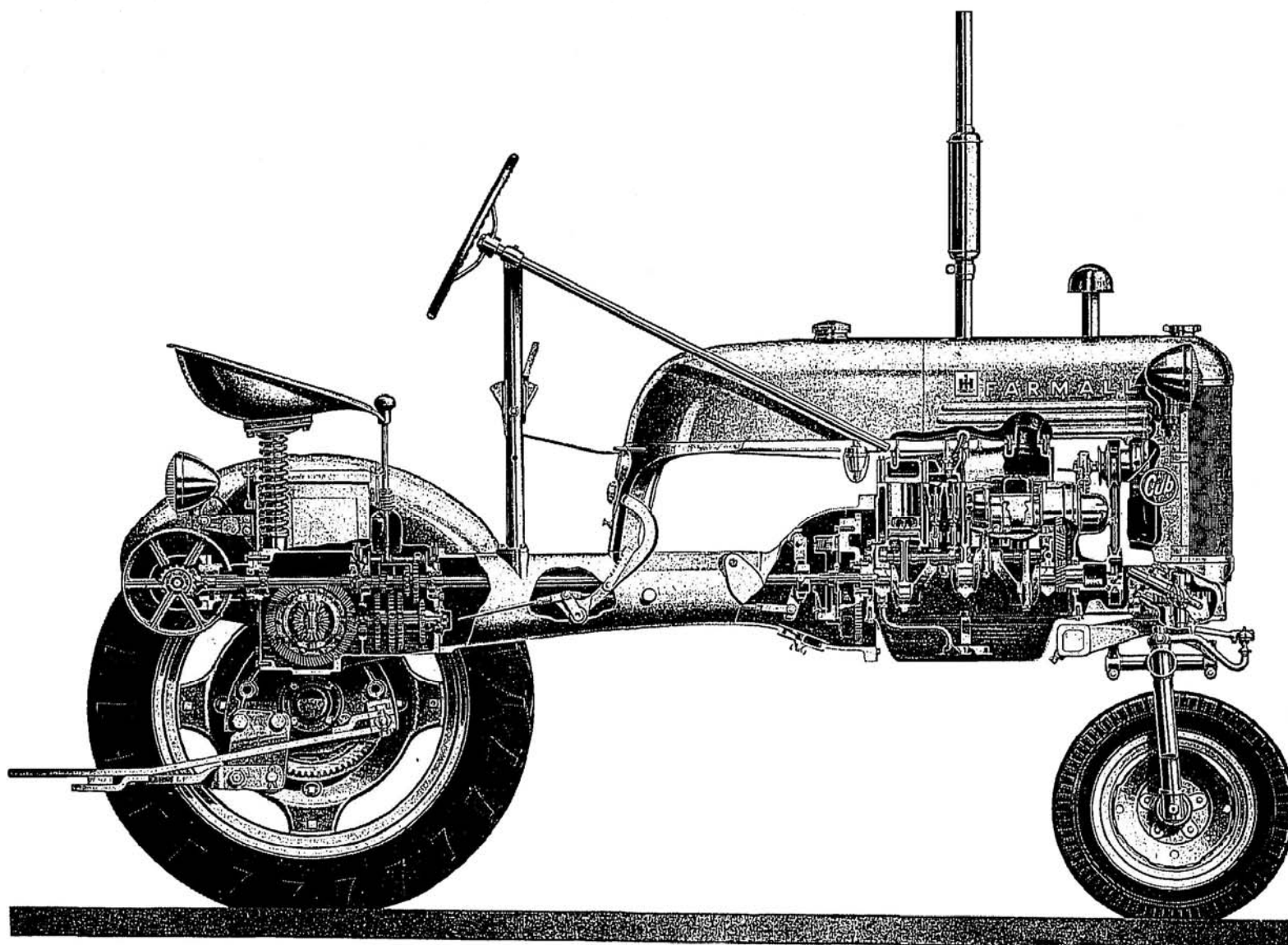
Illust. 37—Transmission Oil Level Plug.



Illust. 38—Transmission Oil Drain Plug.



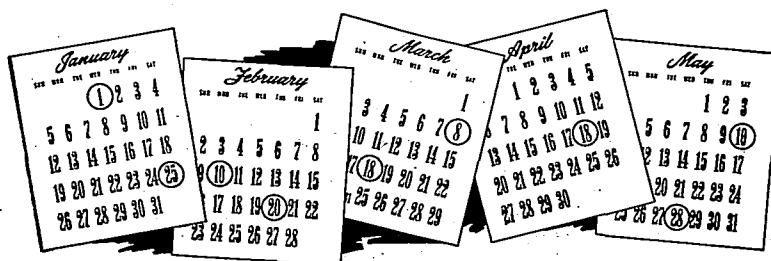
Illust. 39—Rear Axle Housing.



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Cutaway view of the Farmall Cub showing the internal working parts. The Starting and Lighting, Belt Pulley, Power Take-Off, Exhaust Muffler and Swinging Drawbar shown in this illustration are special features.

MAINTENANCE



Periodic Inspections

To keep your tractor performing efficiently, it is advisable to systematically inspect it at intervals as outlined below.

After Every 10 Hours of Operation

- Air cleaner cap.....Remove any dirt or chaff, *page 28. (When unusual dust or dirt conditions are encountered during operation it may be necessary to service these points more frequently.)*
- Air cleaner oil cup.....Remove, clean and refill, *page 28.*
- Lubrication points.....See "Lubrication Guide."
- Cooling system.....Check level of coolant in radiator, *page 26.*
- Fuel tank.....Fill with a good grade of clean gasoline.

After Every 60 Hours of Operation

- Air cleaner, complete.....Remove and clean, *page 28. (When unusual dust or dirt conditions are encountered during operation it may be necessary to service these points more frequently.)*
- Flexible rubber connection between air cleaner and carburetor.....Inspect for loose fit or damage.
- Fan belt.....Check tension; replace when necessary, *page 27.*
- Radiator fins.....Clean spaces, *page 27.*
- Lubrication points.....See "Lubrication Guide."
- Storage battery.....Check liquid level and specific gravity, *pages 37 to 39.*

After Every 120 Hours of Operation

- Lubricating oil filter.....Replace filter element, *page 15.*
- Engine crankcase.....Drain and change oil.
- Lubrication points.....See "Lubrication Guide."
- Crankcase breather cap.....Clean in kerosene.

After Every 250 Hours of Operation

- Fuel strainer and sediment bowl.....Take apart and clean, *page 25.*
- Spark plugs.....Remove and clean; check gap, *page 29.*
- Magneto breaker points and chamber.....Clean chamber and check gap, *page 30.*
- Magneto drive chamber and impulse coupling.....Check and clean if necessary, *page 31.*

After Every 400 Hours of Operation

- Cooling system.....Clean, *page 26.*
- Engine valves.....Check for clearance, *page 39.*
- Clutch pedal.....Check for free movement, *page 40.*
- Brakes.....Check for free movement and equalization, *page 41.*
- Lubrication points (500 hours).....See "Lubrication Guide" (Periodical).

After Every 6 Months

- Front wheels.....Clean and repack with new grease, *page 16.*
- Lubrication points (1000 hours).....See "Lubrication Guide" (Periodical).

FARMALL CUB

Carburetor

The presence of dirt and water in the fuel will disturb the functioning of the carburetor. Use a good grade of clean gasoline.

The fuel strainer (located under the gasoline tank) collects practically all the dirt and sediment which may enter into your gas tank. Clean the fuel strainer after every 250 hours of operation.

A small strainer screen is provided in the carburetor at the fuel-line connection. This screen prevents dirt or metal chips which may have collected in the fuel line during field installation from entering the carburetor. The screen can be cleaned if necessary, when the carburetor is removed by removing the fuel bowl cover and float valve cage assembly and forcing air through the screen in the opposite direction from fuel flow.

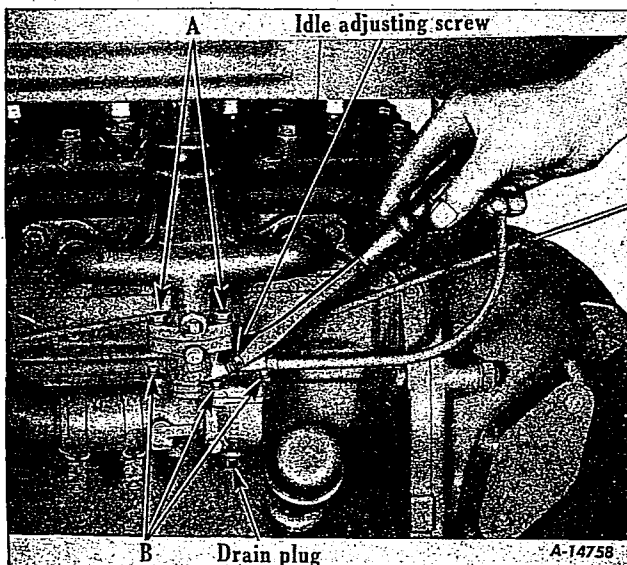
Check the flange nuts "A," *Illust. 42*, which hold carburetor to manifold periodically for tightness.

Occasionally check the cover screws "B," *Illust. 42*, which fasten the fuel bowl to fuel bowl cover. They must be kept tight to avoid any air leakage past the fuel bowl cover gasket.

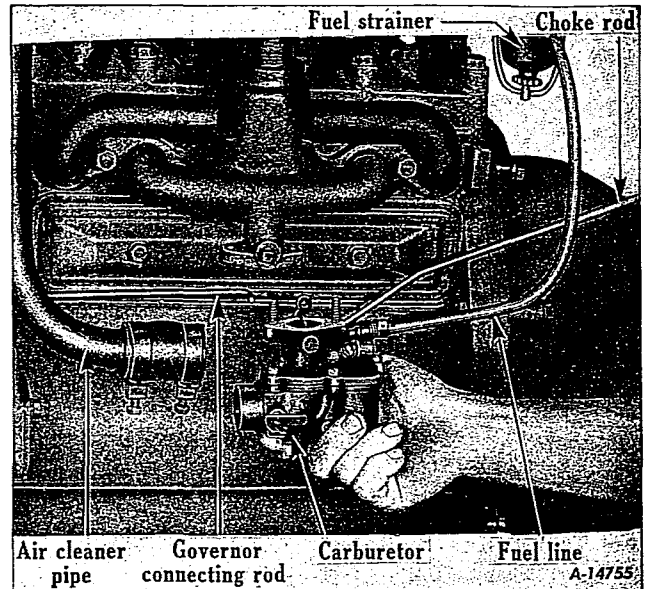
The engine and carburetor are correctly set when shipped from the factory. If, for any reason, this setting has been disturbed, the following procedure should be followed:

Adjusting Idle Adjusting Screw

Close the idle adjusting screw to its seat by turning to the right (or in), then open one full turn.



Illust. 42—Carburetor Adjustment.



Illust. 43—Removal of Carburetor.

Start the engine and operate it at the fast idling speed (without any load) until thoroughly warm. (Cover radiator if necessary.)

Close the throttle by pulling the engine speed control lever all the way back. If the engine misses or rolls, slowly turn the idle adjusting screw in or out until engine operates smoothly. Speed up the engine for a few seconds, then recheck idle.

Removing the Carburetor

1. Close the shut-off valve on the fuel strainer.
2. Drain the carburetor by removing the drain plug.
3. Disconnect the choke and governor controls.
4. Disconnect the fuel line.
5. Remove the air cleaner connections to the carburetor.
6. Remove the two nuts and lock washers holding the carburetor to manifold and lift off the complete carburetor, *Illust. 43*.

Installing the Carburetor

1. Install the carburetor on the engine in the reverse order of removal.
2. Always install a new gasket between carburetor and manifold if the old gasket is damaged.
3. Be sure the carburetor drain plug is screwed in tight; then turn on the gasoline supply.
4. Adjust the carburetor as described previously.

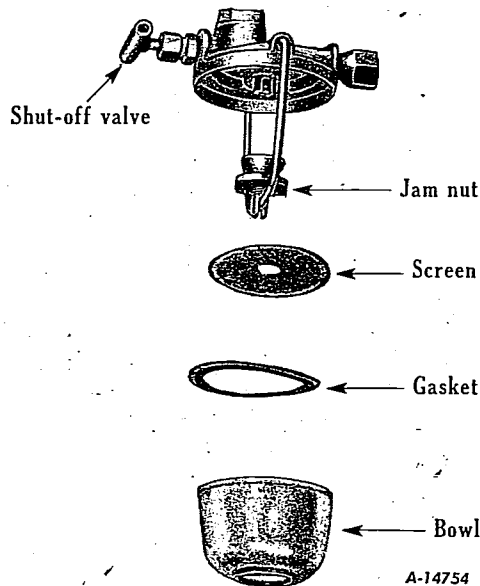
MAINTENANCE

Fuel Strainer

Cleaning the Fuel Strainer and Sediment Bowl

The fuel strainer should be cleaned after every 250 hours of operation; to do this, proceed as follows:

1. Close the shut-off valve.
2. Take the strainer apart by loosening the lower jam nut.
3. Clean out the sediment bowl and clean the screen if necessary.
4. When reassembling, be sure that the cork gasket between the bowl and main body is in good condition and does not leak. Use a new gasket if necessary.



Illust. 44—Fuel Strainer Showing Glass Bowl Removed for Cleaning.

Cold Weather Precautions

When operating the tractor in temperatures of 32° Fahrenheit or lower, observe the following precautions:

Fuel System

Use only a high-test, winter-grade gasoline, and keep your supply in a closed container so the more volatile portion does not evaporate.

Fill the fuel tank at the end of the day's run to prevent moisture from collecting in the tank.

Lubrication

Be sure to use the correct grade of lubricant in

the engine crankcase, air cleaner, magneto impulse coupling, rear axle housings, transmission, steering gear case and belt pulley housing as specified on page 17.

Magneto Impulse Coupling

For satisfactory starting, it is important to keep the magneto impulse coupling oiled liberally, as specified on page 31. The impulse coupling should be kept free of dirt and gummy rust formation.

When hand cranked, the impulse coupling should trip (click) twice for each revolution of the engine. Failure to do so may indicate the need for cleaning. (Refer to page 31 for further information.)

Cooling System

When the temperature is likely to be 32° Fahrenheit or lower, there is danger of the water freezing in the cooling system. To prevent this, either drain the water from the cooling system at the end of each run, or use one of the recommended anti-freeze solutions.

To Drain the System

1. Remove the radiator drain plug on bottom (left side) of the radiator, *Illust. 45*.
2. See that the drain is not plugged and that water drains completely.

Important! Before filling the radiator in freezing weather, cover the entire radiator and start the engine; then put in water immediately. This prevents water from freezing during warming-up period. When the engine has warmed up, uncover the radiator.

1. If an anti-freeze is to be used, observe the following instructions:
2. Drain and clean out the cooling system as described on page 26.
3. Inspect the hose connections. They must be in good condition inside and out. Then tighten all water connections.
4. Inspect the fan belt and adjust it to the proper tension as described on page 27. If the belt is worn or oil soaked it is best to install a new one.
5. Before refilling the cooling system make sure that the radiator drain is tightly closed. Then put the required amount of anti-freeze into the cooling system. Fill up the radiator with clean water (use soft or rain water if possible) to a level slightly below the bottom of the filler neck.

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The table below shows the amount of anti-freeze to use for various temperatures.

Caution! Use only one type of anti-freeze. Do not use a mixture of solutions as it will be difficult to determine how much protection you have against freezing.

Never use any of the following in the cooling water as an anti-freeze:

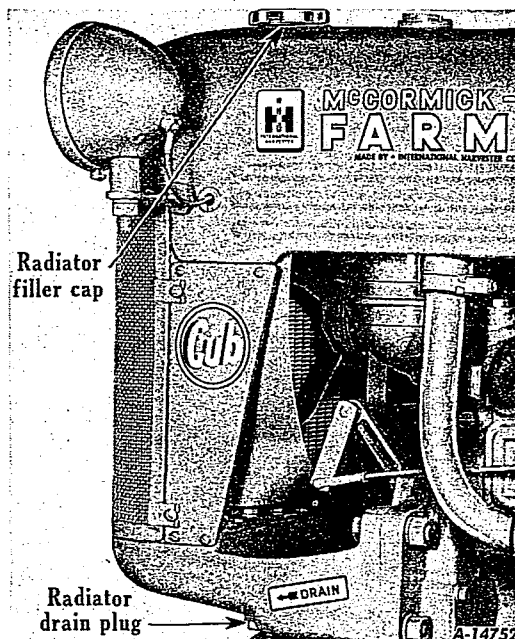
Honey, salt, kerosene, Diesel fuel, glucose, or sugar, calcium chloride or any alkaline solution.

Do not use alcohol as an anti-freeze if other materials are available as denatured alcohol boils at 173° F. However, if it is necessary to use alcohol, check the solution frequently to see that you have adequate protection against freezing.

Freezing Point (Fahrenheit)	Pints of anti-freeze Required		
	Ethylene Glycol	Distilled Glycerine	Denatured Alcohol
10°	5	6½	6
0°	6½	8	7½
-10°	8	9½	8½
-20°	9	10½	10
-30°	10	11½	11½
-40°	10½	—	13
-50°	11½	—	14
-60°	12	—	15½
-70°	13	—	—



Should the motor overheat, allow the engine to cool off before removing the cap to fill the radiator. When removing the cap, be extremely careful to avoid being scalded by steam which has built up pressure in the radiator.



Illust. 45—Water Cooling System.

Cooling System

The water is circulated through the engine block, cylinder head and radiator by thermo-syphon method. As the engine warms up, the water is heated, expands and circulates back through the radiator where the water is cooled before again circulating through the engine.

To Clean Out Dirt and Sludge

1. Drain the cooling system by removing the drain plug, *Illust. 45*. Allow the system to drain and replace the plug.
2. Fill the cooling system with a solution of 2 pounds of ordinary washing soda mixed with 9¾ U. S. quarts of water (cooling system capacity).
3. Leave off the radiator filler cap and operate the engine until the water is hot, then drain and flush with clean water.

To Fill Cooling System

1. The water capacity is approximately 9¾ U. S. quarts.
2. Replace the drain plug.
3. Fill the radiator to a level slightly below the bottom of filler neck. Filling the radiator to this level will allow for expansion of the coolant under normal operating conditions.

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Note: Do not pour cold water into the radiator if the engine is very hot, unless conditions make it absolutely necessary, in which case start the engine and let it idle, slowly pour the water into the radiator.

4. If the engine is to be operated in freezing temperatures, refer to "Cold Weather Precautions," pages 25 and 26.

Radiator Core

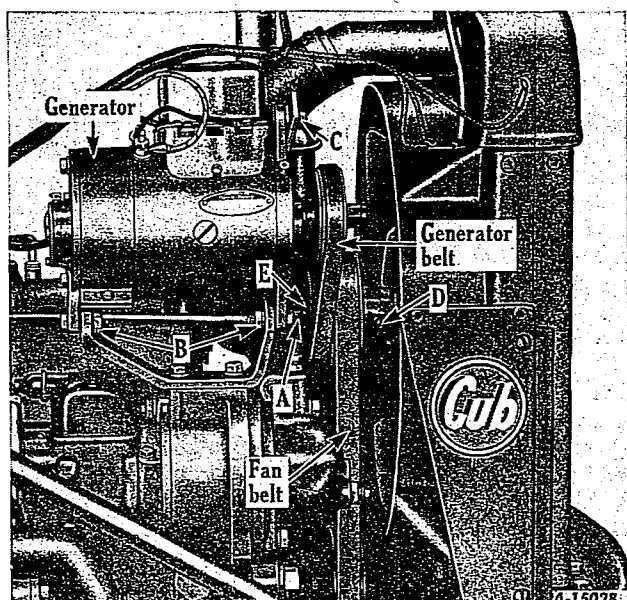
Overheating is often caused by bent or clogged radiator fins. If the spaces between radiator fins become clogged, clean them with an air or water hose. When straightening bent fins, be careful not to injure tubes or break the bond between fins and tubes.

Fan Belt Tension

Check the slack of the fan belt frequently to assure maintenance of the correct tension. The tension is correct when the belt can be depressed without effort by the thumb, approximately $\frac{3}{4}$ inch to 1 inch, midway between the two pulleys, *Illust. 47*. If the slack is more than 1 inch, adjust belt as follows:

Adjusting the Fan Belt

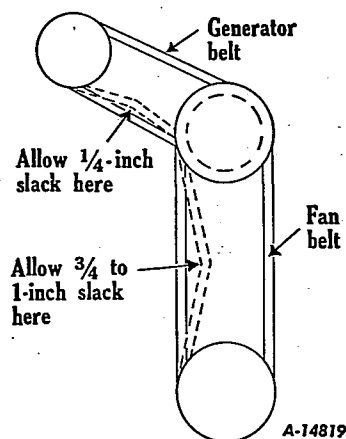
When the tractor is equipped with a generator, first loosen the nuts "B" and "C" before adjusting the fan belt tension. The tension of the fan belt is adjusted by loosening the fan spindle "A," *Illust. 46*, and moving the fan and hub assembly up or down



Illust. 46—Fan and Generator Belts.

until the correct tension is obtained. After the correct tension is obtained tighten the fan spindle "A." To adjust the generator belt refer below.

After a new belt has been in use approximately 50 hours, check the tension and adjust again if necessary.



Illust. 47—Correct Belt Tension.

Removing the Fan Belt

To remove the fan belt, loosen the fan spindle nut "A," *Illust. 46*, and slide the fan and hub assembly to the bottom of the groove on the crankcase front cover. The fan belt can then be slipped over the bottom drive pulley and worked up over the fan blades.

Replacing Fan Belt

Replace the fan belt when it becomes soaked with grease, or when it is so badly worn that it does not drive the fan at the proper speed.

When replacing the belt, reverse the procedure outlined under "Removing Fan Belt," except that belt can be started on the lower pulley by hand, and by slowly cranking the engine, the belt will find the correct position.

Generator Belt

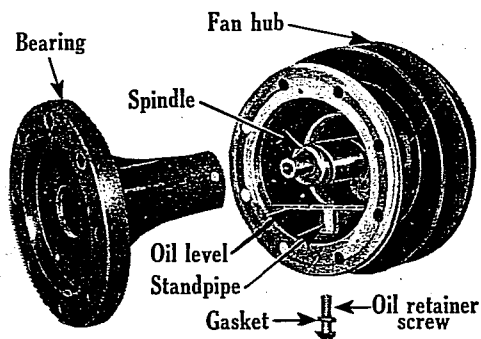
After the fan belt tension has been adjusted, move the generator toward or away from the engine to get the correct generator belt tension, then tighten nuts "B" and "C." The generator belt should be tight enough as not to allow slippage but not so tight as to cause side thrust on the generator bearing. Allow $\frac{1}{4}$ inch slack, *Illust. 47*.

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Fan Hub Lubrication

After every 60 hours of operation or at least once every week, remove oil retainer screw "D," *Illust. 46*, and turn the fan assembly so that the oil filler hole is at the right horizontal position. Add engine oil until oil reaches the level of the hole. Now turn the assembly so that the hole is on the bottom and allow any excess oil to drain out. Oil is then up to level of the top of stand pipe (approximately $\frac{1}{10}$ pint), *Illust. 48*. Replace the oil retainer screw and be sure that the retainer screw gasket is in place.

Note: The rubber gasket located behind the hub at "E," *Illust. 46*, is used for shipping purpose only. It does not have to be replaced when worn out.



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Illust. 48—Fan Hub Partially Disassembled Showing Oil Level.

Air Cleaning System

Clean air for combustion is assured by an oil-type air cleaner. A heavy screen in the air intake cap prevents large particles from entering the air cleaner. The air then passes to the oil cup where it goes through a bath of oil. As the air rises to the intake manifold it passes through a series of oil-bathed screens and the fine dust is removed. As the oil from the screen works back down, it carries the dirt with it and settles in the oil cup. The oil cup must be cleaned and refilled regularly with new oil.

Oil Cup Service

Remove the oil cup by pushing the oil cup bail toward the engine, *Illust. 49*. Clean and refill the oil cup every day, or every 10 hours of operation (more frequently when operating under dusty conditions). Refill the oil cup to the oil level bead with the same grade of oil used in the engine crankcase. The capacity of the oil cup is $\frac{1}{2}$ U. S. pint

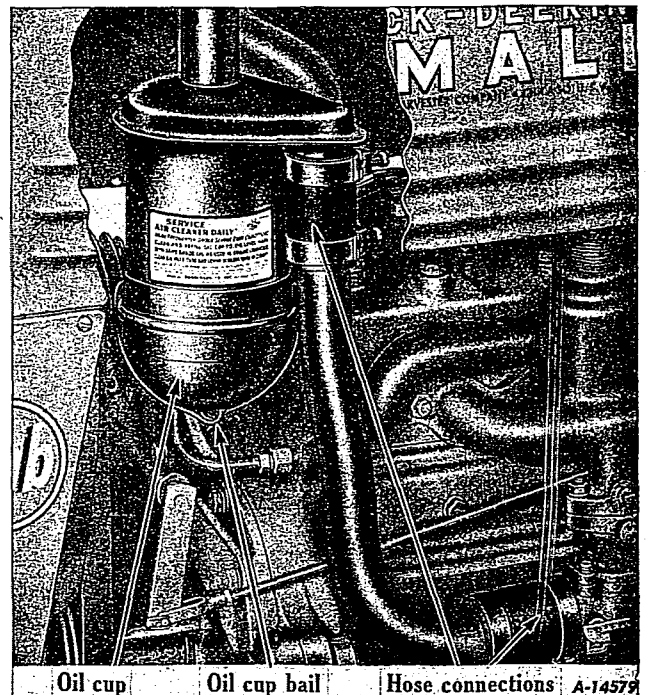
for the Donaldson Air Cleaner and $\frac{3}{8}$ U. S. pint for the United, whichever type is used (the name appears on the air cleaner). Do not remove oil cup while engine is operating. Before replacing the oil cup, clean or wipe the oil or grit from the top bead of oil cup.

Air Intake Cap and Screen

The screen in the air intake cap prevents chaff and other coarse dirt from getting into the air cleaner. This screen should be kept clean and free from all chaff, oil, dust, or paint as clogged holes in the screen will reduce the power of the engine by restricting the flow of air.

Washing the Cleaner

After every 60 hours of operation—particularly if operating the tractor in an atmosphere heavily laden with dust, chaff or lint—remove the entire air cleaner from the tractor, disassemble it, *Illust. 50*, and wash the parts thoroughly in kerosene. Be sure to clean out the air intake pipe. After all parts have been thoroughly cleaned, replace the air cleaner body on tractor. Make sure all joints are airtight. Replace the air intake cap. Fill the oil cup to the proper level with the specified grade of oil and replace it on the air cleaner. Be sure it is held securely in place by the oil cup bail.

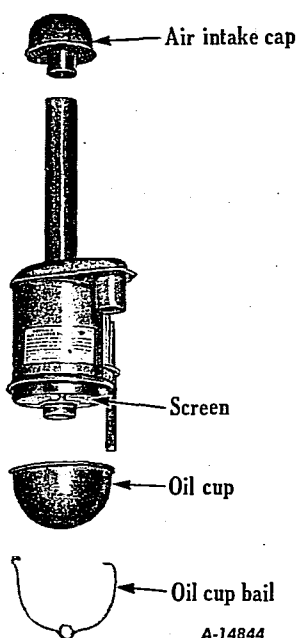


Illust. 49—Servicing the Oil Cup.

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General Precautions

As an added precaution against dirt getting into the engine, frequently inspect the flexible rubber hose connections between the carburetor and the air cleaner. If they show any sign of deterioration, replace them. To eliminate strain on the rubber hose connections, be sure pipes line up. All joints between the air cleaner and carburetor, manifold and the cylinders of the engine should be tight. All gaskets must be in good condition and the bolts should be drawn up tight.



Illust. 50—"Exploded" View of Air Cleaner.

Spark Plugs and Cables

Spark Plugs

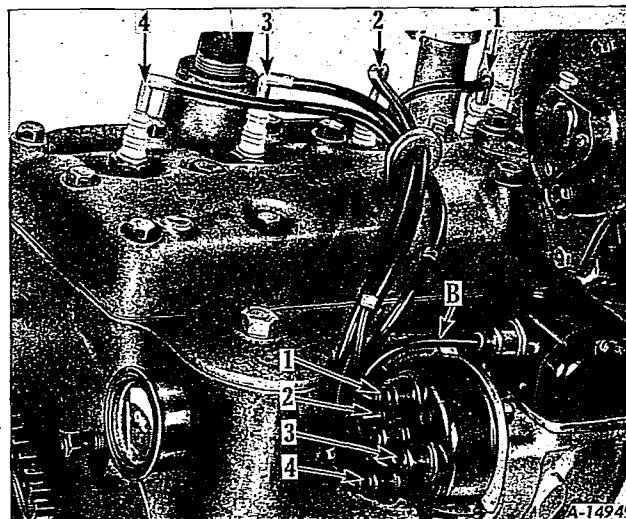
The spark plugs best suited for this engine are the Champion No. 15-A or AC-87 and should be used ordinarily.

Caution: Remove all dirt from the base of the spark plug before removing the spark plug.

Remove the spark plugs after every 200 to 300 hours of operation, for cleaning and checking gaps between electrodes. A gap of .023 inch should be maintained (a gauge of this thickness is furnished). When making this adjustment, always bend the outer electrode. Never bend the center electrode as it may damage the insulator. If the gap between the electrodes is too great, due to improper setting or burning off of the ends, the engine will misfire and be hard to start.

Special Spark Plugs

To remedy fouling or sooting, use a hotter (light service) spark plug. To remedy auto-ignition and burning of electrodes, use a colder (severe service) spark plug. For special spark plugs see your International Harvester dealer.



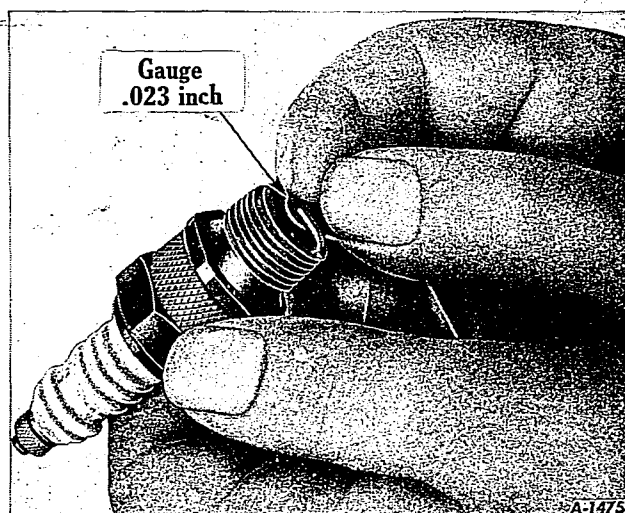
Illust. 51—Spark Plug Wiring. Engine Firing Order is 1, 3, 4, 2.

Cleaning Spark Plugs

Sandblasting is the recommended method of cleaning spark plugs. Never scrape or clean the insulator with anything which will scratch the porcelain. Scratched porcelain allows carbon and dirt to accumulate much faster.

Spark Plug Cables

If spark plug cables are removed for any reason, note the position of each cable on the magneto (Illusts. 51 and 57 show the correct wiring).



Illust. 52—Checking the Spark Plug Gap.

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Magneto

Your tractor is equipped with a high-tension magneto which is designed and built in accordance with the latest ignition practices. A magneto of this type is used by International Harvester because our engineers have proved that it is superior from the standpoint of performance, long life, and trouble-free operation.

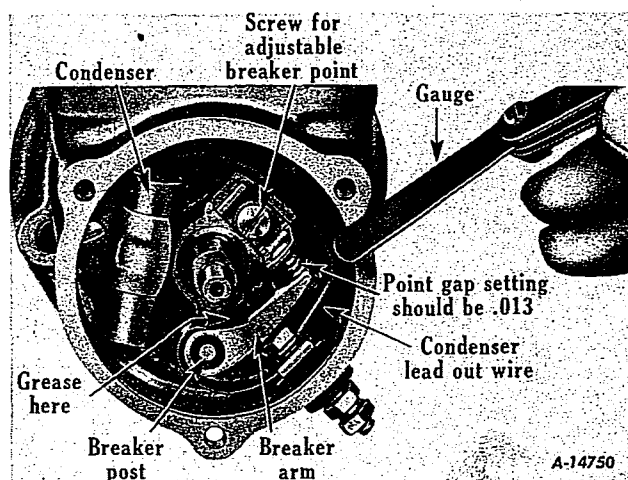
Lubrication

After every 500 hours of operation fill the rotor bearing oil cup (on mounting flange), *Illust. 57*, once with the same oil as used in the crankcase.

Greasing Breaker Mechanism and Checking Points

It is important that the breaker chamber be kept clean, as oil on the breaker points will cause rapid burning. Inspect the breaker chamber after every 250 hours of operation, to assure that it is clean. To reach the breaker mechanism, remove the distributor cap, and crank the engine slowly until the end "B" of the distributor rotor arm points toward the No. 1 terminal on distributor cap, and impulse coupling just trips. Take off the distributor body by removing the three screws "A," *Illust. 54*. See that the points are in good condition and have the proper clearance. If the chamber is clean, no attention is necessary other than checking the clearance of the points; but if the chamber is dirty, all parts must be thoroughly cleaned.

Do not crank the engine while distributor body is removed or it might be necessary to retune the magneto to the engine.



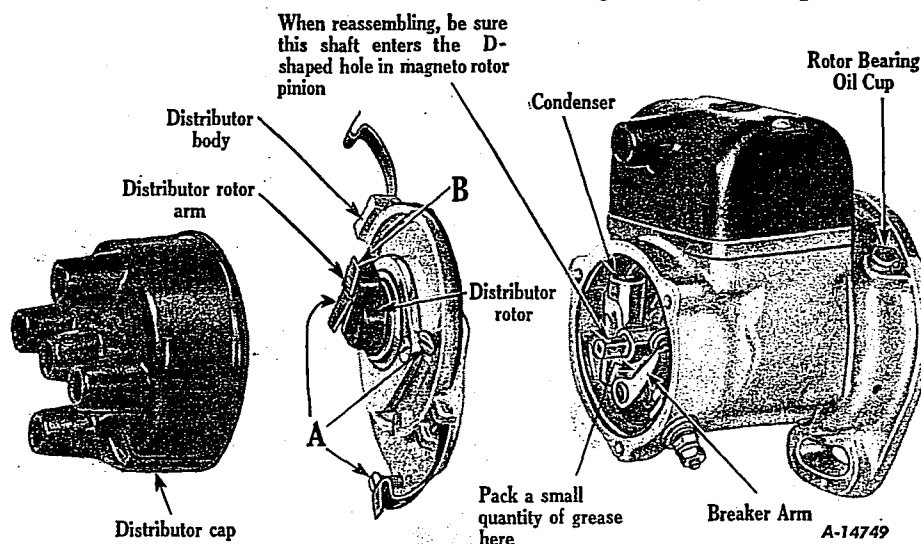
Illust. 53—Adjusting the Breaker Points.

Remove the breaker arm from the chamber, and clean all parts. Inspect the breaker points and, if necessary, dress them with a sharp, fine file. If the points are worn excessively, replace both points.

Fill the recess in the breaker post with grease and pack a small quantity of magneto grease in back of the breaker arm rubbing block (*Illusts. 53 and 54*). See your International Harvester dealer for the proper grease to use.

Replace the breaker arm and be sure the points line up when breaker arm is in place.

Check the gap between the breaker points, *Illust. 53*, with the gauge furnished with the tractor. The point opening should be .013-inch when the rubbing block is on the high part of the cam. If gap is not correct, adjust it by loosening the screw holding the adjustable point, *Illust. 53*, and moving



Illust. 54—Magneto Disassembled

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the point up or down until gauge slips snugly into opening. After the proper adjustment has been made, tighten the screw.

With the engine on top dead center of the No. 1 firing stroke, turn the distributor rotor until the end "B" of the distributor rotor arm points to No. 1 terminal on the distributor cap. Place the distributor body on the magneto and be sure the rotor shaft enters the D-shaped hole in the magneto rotor pinion. Be sure the gasket is in place and tighten the three screws "A," *Illust. 54*. Replace the distributor cap.

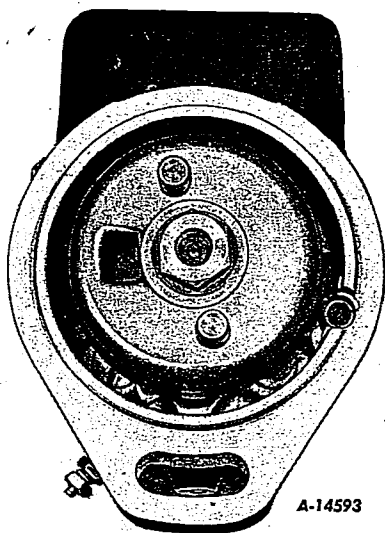
Greasing Distributor Gear

After every 2,000 hours of operation or at least every year the distributor gear and distributor gear chamber should be cleaned and repacked with IH magneto grease. We recommend this be done by your International Harvester dealer's serviceman.

Distributor Cap

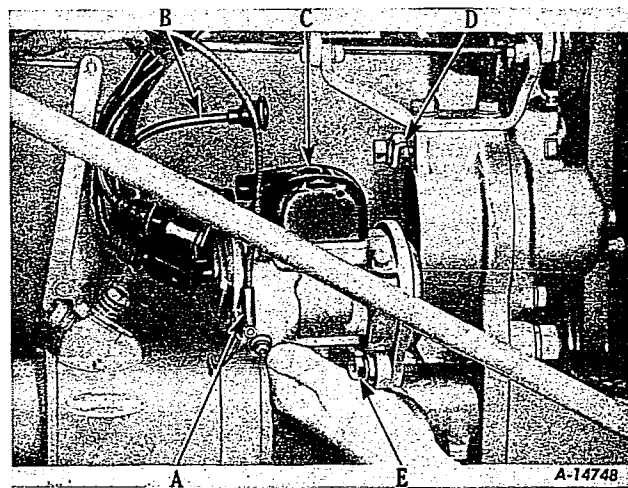
Every three or four months, remove the distributor cap and examine the inside. If any dust, moisture or oil deposits are present, thoroughly clean and wipe dry. To assure long life of the distributor, care must also be taken to keep the three small ventilator holes in the bottom of the distributor cap open at all times. Also see that the distributor rotor is kept clean.

If the distributor cap terminal nipples are removed, be sure that the terminals and coil cover terminals are clean and dry.



Illust. 55—Magneto Removed Showing Impulse Coupling.

The magneto is equipped with these nipples to prevent any external electrical leakage when the tractor is operating under adverse conditions.



Illust. 56—Removal of the Magneto.

Magneto Impulse Coupling and Magneto Drive Chamber

When hand cranked, the impulse coupling should trip (click) twice for each revolution of the engine. Failure to do so indicates the need of cleaning or service.

Remove the magneto as described below. Hold the magneto at an angle of approximately 45 degrees, and flush the impulse coupling and magneto drive chamber with kerosene. During warm weather, oil the impulse coupling liberally with light oil such as cream separator or sewing machine oil. Do not use oil during cold weather (below 32° F.). Flushing with kerosene is all that is required.

If it is necessary to remove the impulse coupling from the magneto for cleaning or service, we recommend that this be done by your International Harvester dealer's serviceman.

Removal of the Magneto

1. Disconnect the switch cable "A" by removing the nut and lock washer attaching the cable to the magneto terminal.
2. Pull out cable "B" from the coil cover "C" and remove the distributor cap.
3. Loosen the nut holding the magneto mounting clip "D" and remove capscrew "E." The magneto assembly can then be removed, *Illust. 56*.

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Installing and Timing the Magneto to the Engine

1. Pull out cable "B," *Illusts. 56 and 57*, from the coil cover end. This will eliminate any possibility of accidental starting.

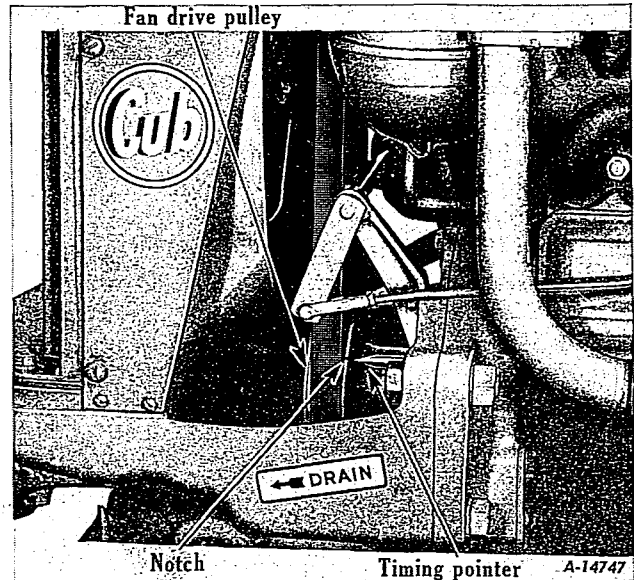
2. Crank the engine until No. 1 piston (the piston next to the radiator) is on the upper dead center of the compression stroke. The compression stroke can be determined by removing the No. 1 spark plug, placing the thumb over the opening, and cranking the engine until an outward pressure is felt. Continue cranking slowly until the notch on the fan drive pulley (on the crankshaft) is in line with pointer on front crankcase cover, *Illust. 58*. Both intake and exhaust valves will then be closed.

3. Remove the distributor cap and turn the magneto impulse coupling, *Illust. 55*, in a counter-clockwise direction (as viewed from the coupling end) until the end "B" of the distributor rotor arm points toward the No. 1 terminal on the distributor cap, *Illust. 54*. Then replace the distributor cap.

4. Assemble the magneto on the engine, making sure that the lugs on the impulse coupling engage in slots on the magneto drive coupling. (Assemble the magneto so that the top is as close to crankcase as possible.)

5. Insert the magneto mounting bolt "E" loosely in the magneto flange, just enough to hold magneto in place. Then crank the engine one complete revolution to next top dead center. Now, pull the upper part of the magneto away from the engine until impulse coupling just trips.

6. Tighten the mounting clip nut "D" and bolt "E," *Illust. 56*, securely. Attach the spark plug cables to the engine and magneto. Start by con-



Illust. 58—Notch on Fan Drive Pulley in Line with Timing Pointer.

necting No. 1 cylinder spark plug to socket marked "1" on distributor block; connect No. 3 socket with No. 3 cylinder; next with No. 4 cylinder, and next with No. 2 cylinder. (See *Wiring Chart, Illusts. 51 and 57*.)

7. Connect the switch cable to the magneto terminal.

8. To check the timing, crank the engine slowly until top dead center of No. 1 cylinder is reached, at which time impulse coupling should just trip.

9. The magneto is now correctly wired and timed.

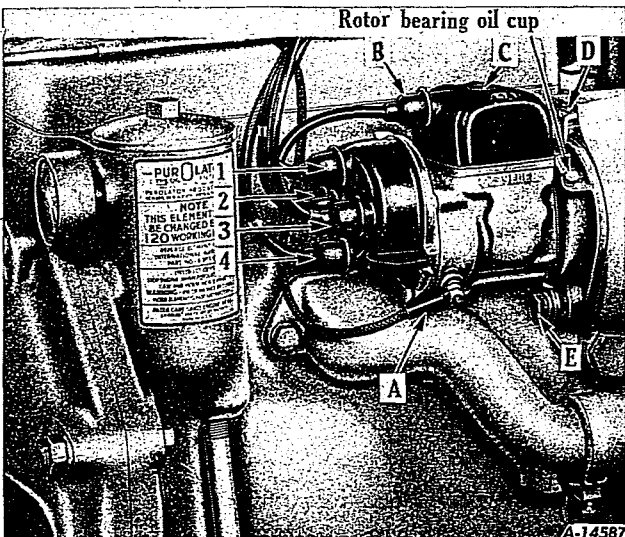
10. Push cable "B" back into the socket in coil cover, *Illust. 57*.

Starting and Lighting Equipment

Description

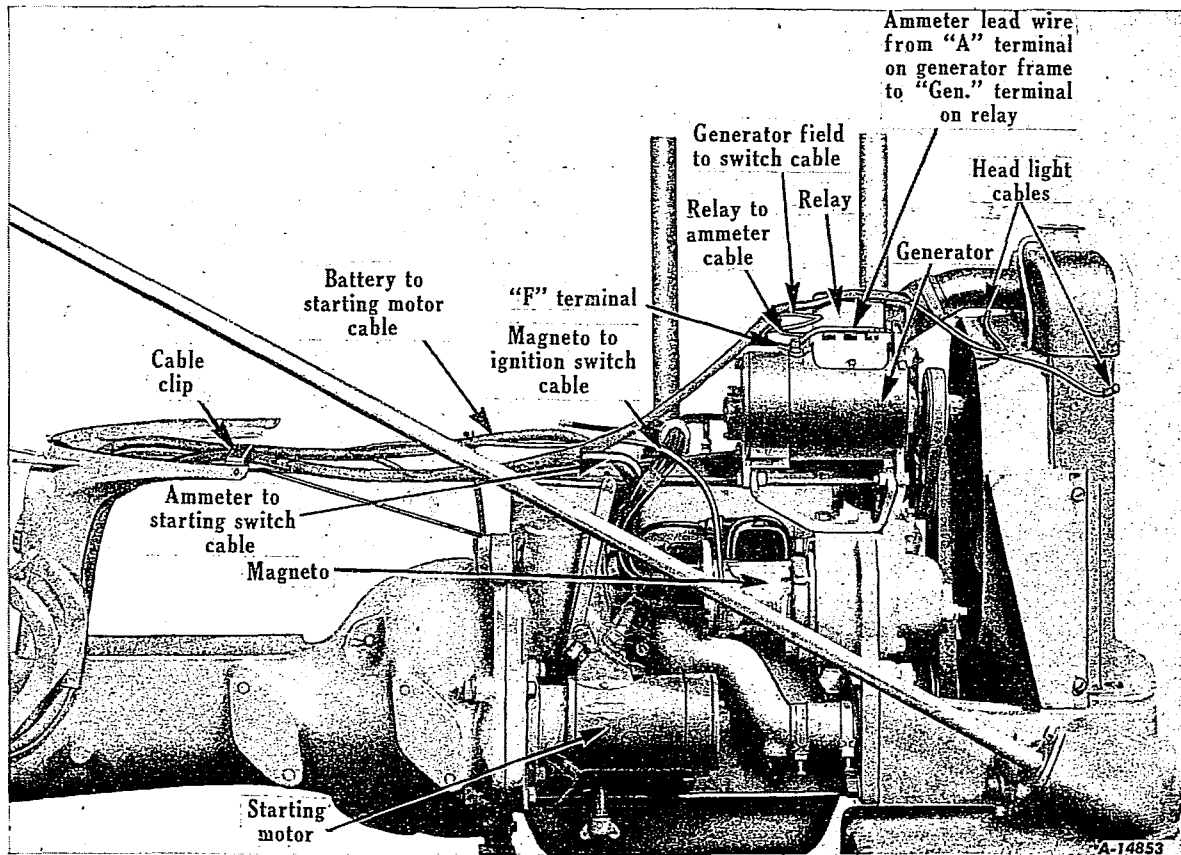
The electrical system of the tractor is a 6-volt type and consists of a generator, generator cutout relay, starting motor, lamps, light switch and a six-volt battery. The system is a single-wire type with a ground return to the batteries. The cables are contained in a harness of non-metallic oil and waterproof woven braid.

Use the illustrations on *pages 33 and 34*, also the wiring diagram on *page 59*, as a guide for identifying the various electrical units and for tracing the electrical cables and connections. Be sure all terminals are clean and securely fastened.

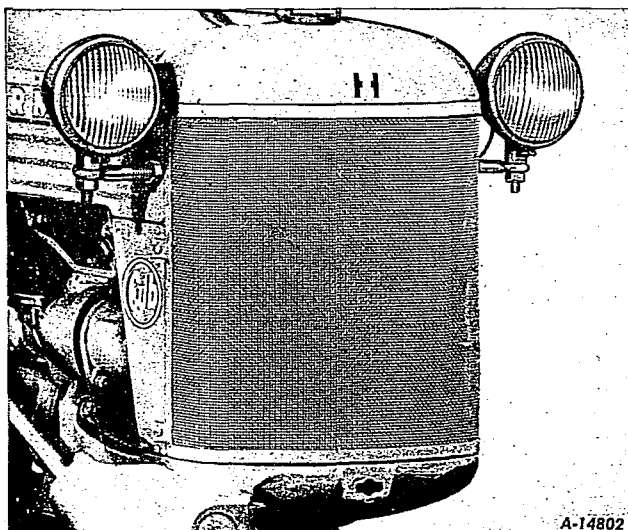


Illust. 57—J-4 Magneto Wiring (Clockwise Rotation).

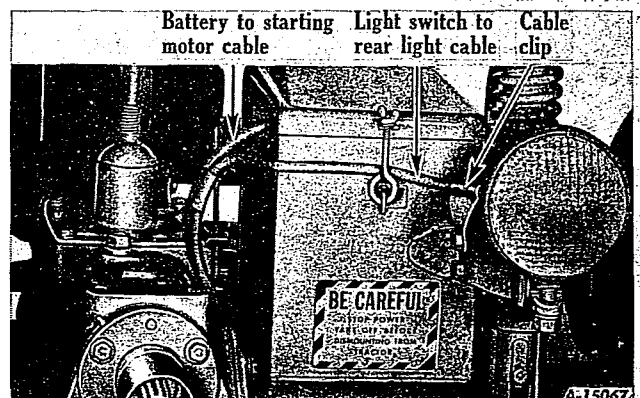
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Illust. 59—Hood and Fuel Tank Removed Showing Electrical Wiring.

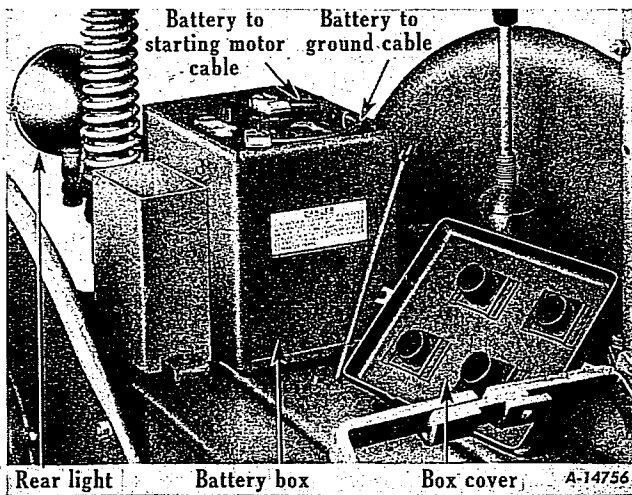


Illust. 60—Headlights and Connections.



Illust. 61—Rear Light and Battery Box.

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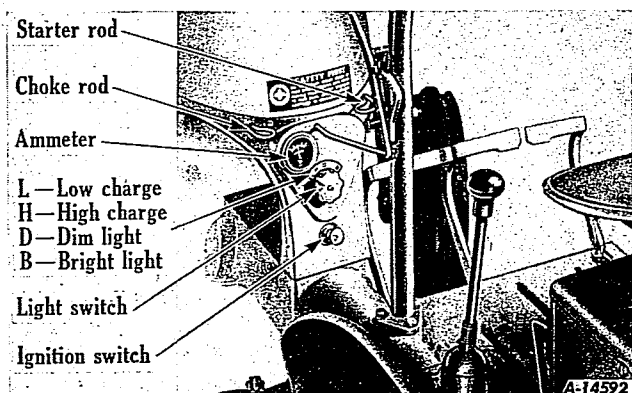
Illust. 62—Battery and Cables.

When the electrical equipment is installed at the factory, the tractor is shipped with the battery ground cable disconnected, *Illust. 62* and, in addition, the wire leading to the "F" terminal on the generator is not connected, *Illust. 59*. Therefore, before starting the tractor, be sure the battery ground cable and the generator wire are connected to their correct terminals.

Before working on any part of the electrical system, disconnect the battery ground cable, *Illust. 62*. Do not reconnect this cable until all electrical work has been completed. This will prevent shorting and causing damage to any of the electrical units.

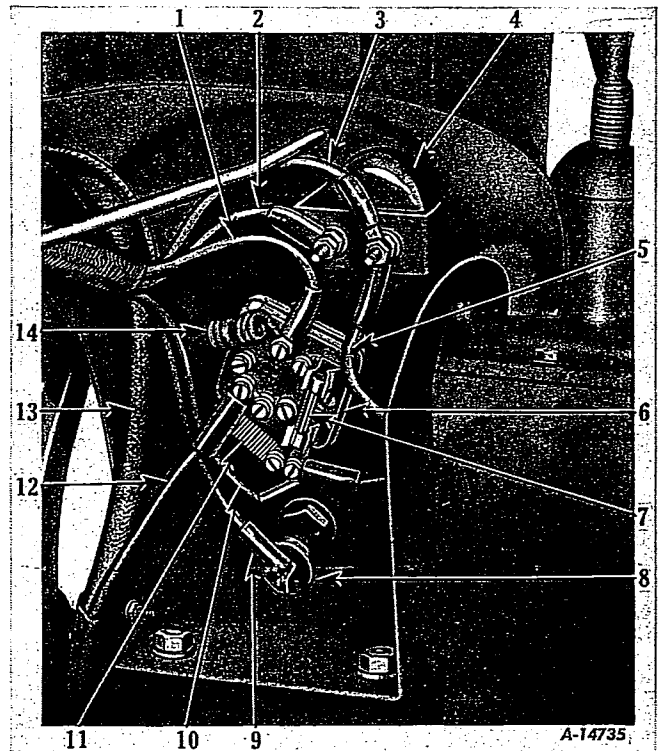
Light and Charging Rate Switch

The light switch not only operates the lights but it also is used to manually control the generator output. This switch, *Illust. 63*, can be operated from the operator's seat. The switch has four positions, Low Charge, High Charge, Dim and Bright.



Illust. 63—Light Switch, Ammeter, etc.

When the switch is in Dim, Bright or High Charge position the field circuit is direct to the ground, giving the maximum generator output for the third brush setting. During the daytime, when the lights are not used, the switch should be placed in the Low Charge position. This adds a resistance coil to the field circuit and reduces the output of the generator to approximately one-half of its original charge rate. If the charge in the battery is low, place the switch in High Charge position until the battery is fully charged.



Illust. 64—Hood and Fuel Tank Removed Showing Light Switch, Ammeter, Fuse, Cables, etc.

Ref. No.	Description
1.	Switch to headlight cable (black).
2.	Ammeter to starting switch cable (natural with red tracer).
3.	Relay to ammeter cable (natural with black and red tracers).
4.	Ammeter.
5.	Ammeter to switch cable.
6.	Light switch.
7.	Fuse.
8.	Ignition switch.
9.	Magneto to ignition switch cable.
10.	Generator field to switch cable (natural with black tracer).
11.	Generator field resistance coil.
12.	Switch to rear light cable.
13.	Battery to starting motor cable.
14.	Dimmer resistance coil.

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A small fuse, *Illust. 64*, is mounted on the light switch. Any time a short circuit or an overload condition occurs in the lighting circuit, the fuse will break the circuit and prevent damage to the electrical system.

Generator

The generator supplies current to keep the battery in a charged condition, replacing the energy consumed by the starting motor and lights. The generator on your tractor is sealed against dirt. It is hinge-mounted to the right side of the engine crankcase and is driven by a V-belt from the fan pulley. The generator as received from the factory has the adjustable third brush set to give an output of approximately 13 to 16 amperes (cold output) and 9 to 11 amperes (hot output).

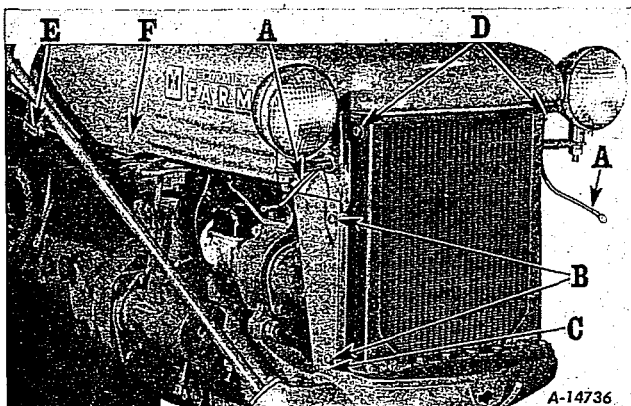
Do not run the generator until the battery charging circuit and the lead from the "A" terminal of the generator to the "GEN" terminal of the relay are connected. The generator will burn out if operated with any wires of the charging circuit disconnected or broken. If it is necessary to operate the generator without the battery, remove the connection from the "GEN" terminal on the relay and ground it on the relay mounting screw, or remove the cable from the "F" terminal on the generator frame. Refer to the wiring diagram on page 59.

Servicing the Generator

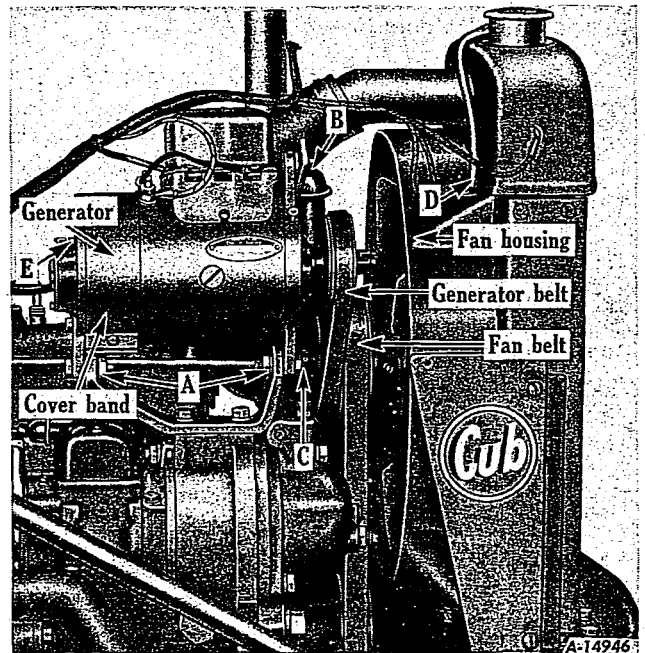
To service the generator other than lubrication, it is necessary to remove the hood and fuel tank assembly as described below:

Removal of Hood and Fuel Tank

1. Remove the radiator cap, air cleaner cap and exhaust muffler (if so equipped). Disconnect each headlight cable "A," *Illust. 65*, and pull the cables through the holes in the hood.



Illust. 65—Removing the Hood and Fuel Tank.



Illust. 66—Generator Belt, etc.

2. Close the fuel strainer shut-off valve, underneath the gasoline tank, *Illust. 10*, and disconnect the fuel line at the fuel strainer.

3. Remove the radiator screen by unscrewing the screws "B," *Illust. 65*, on each side of the radiator screen. Remove the screws at "C" and the cap screws "D" on each side of the radiator. Remove the four screws at the hood and fuel tank support "E." Remove screw "F" and allow the electrical cables to drop free from the hood.

4. Lift the hood and fuel tank assembly up and over the air cleaner pipe and exhaust pipe. Carefully place the assembly on the floor and block up the fuel tank end so as not to damage the fuel strainer or gasoline tank.

Generator Belt Tension

Check the slack of the generator belt to assure maintenance of the correct tension. The belt should never be loose enough to allow slippage but should not be so tight as to cause excessive side-thrust on the generator bearing. Allow approximately $\frac{1}{4}$ inch slack, *Illust. 47*.

Adjusting the Generator Belt

Loosen the two nuts "A," and screw "B," *Illust. 66*, and move the generator toward or away from the engine. After getting the correct tension, tighten the nuts "A" and screw "B."

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Removing the Generator Belt

1. Remove the hood and fuel tank assembly as described above.
2. Remove the four screws holding the fan housing to the radiator.
3. Loosen the two nuts "A" and screw "B," *Illust. 66*. Move the generator in, toward the engine and remove the belt from the generator pulley.
4. Loosen the fan spindle "C," *Illust. 66*, and slide the fan and hub assembly to the bottom of the groove on the crankcase front cover. Remove the fan belt from the bottom drive pulley.

5. Set one of the fan blades in the recess in the fan housing, *Illust. 66*, in such a position that the fan blade will pass by the recess when raised.

6. Slide the fan and hub assembly up and out of the groove and remove the generator belt.

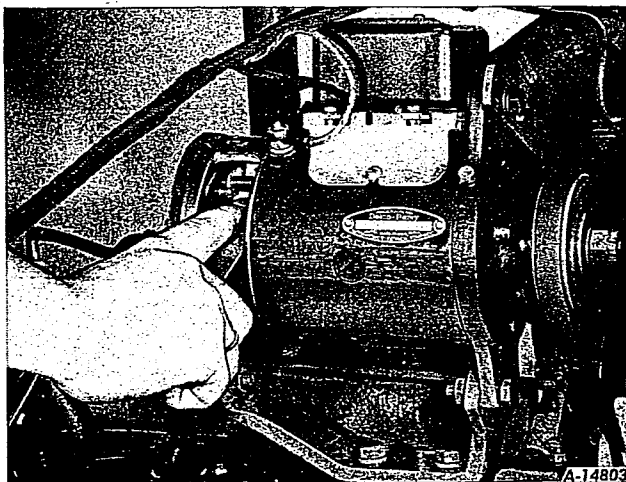
Replacing the Generator Belt

Replace the generator belt when it becomes soaked with grease or badly worn.

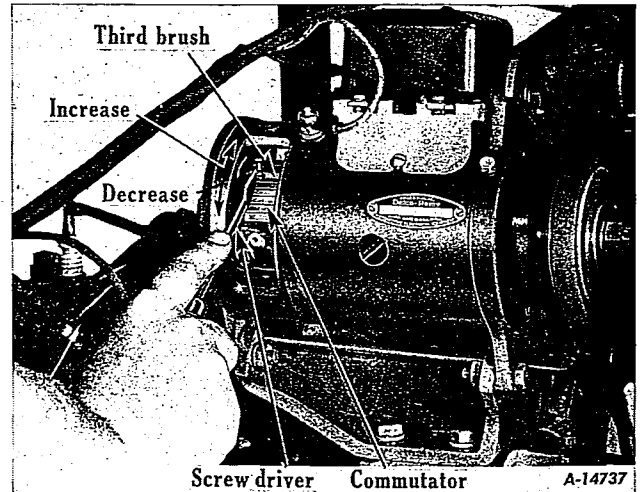
When replacing the belt, reverse the procedure outlined under "Removing the Generator Belt." Before replacing the hood and fuel tank assembly, adjust the fan belt and generator belt as described on *page 27*.

Cleaning Generator Commutator

If the commutator is dirty or slightly grooved, it can be polished by placing a piece of No. 00 sand-



Illust. 67—Cleaning the Generator Commutator.



Illust. 68—Moving the Generator Third Brush to Adjust the Charging Rate.

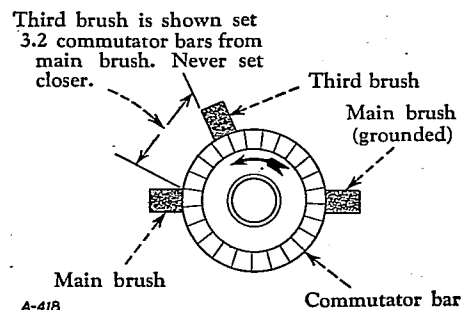
paper on the commutator while the armature is slowly revolving, *Illust. 67*. Never use emery or carborundum cloth. Blow all dust from the commutator after the polishing operation is finished.

If the commutator is badly worn, rough or out-of-round it is advisable to take the unit to your International Harvester dealer, and have the commutator reconditioned.

To Adjust Charging Rate by Third Brush

The maximum rate of charge for the generator (with the switch in the high-charge position, and with no electrical load) is 9 to 11 amperes when "hot" and 13 to 16 amperes when "cold." DO NOT SET BEYOND THESE LIMITS. The battery should be fully charged when checking the maximum generator output.

Remove the cover band, *Illust. 66*, and loosen the round head screw "E" on the outside of the commutator end frame until the lock washer tension is released. Do not attempt to remove this screw. Change the charging rate by moving the third brush, *Illust. 69* (this brush is the one mounted on a movable



Illust. 69—Commutator End (Brush Setting).

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carrier, whereas the other main brushes are mounted directly on the inside of the commutator end frame). The rate of charge is increased by moving the third brush in the direction of rotation of the armature and decreased by moving it in the opposite direction.

The third brush should never be set closer than 3.2 commutator bars from the main brush, Illust. 69.

Lubrication

Follow the lubricating instructions for the generator, as outlined in the Lubrication Guide. Do not lubricate excessively, since excessive oiling may cause the oil and grease to gum on the commutator, and will result in a reduction of the generator output.

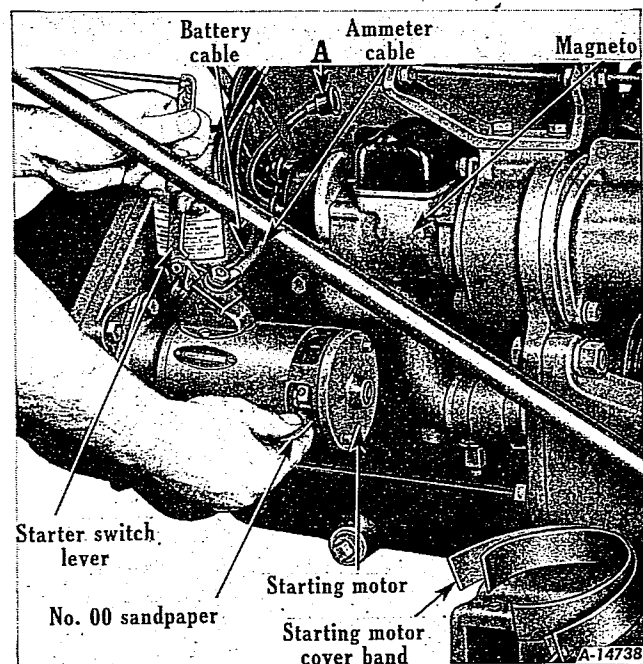
Never oil the commutator.

When all adjustments have been completed, be sure to tighten the round head screw "E," *Illust. 66*, which locks the third brush carrier in place. Reassemble the cover band and be sure the opening in the generator is completely covered.

Unless you are familiar with this equipment and know how to adjust it, we recommend that your International Harvester dealer serviceman make the above adjustments.

Starting Motor

The starting motor is mounted on the right side of the engine crankcase, in front of the clutch housing.



Illust. 70—Cleaning the Starting Motor Commutator.

At regular intervals, remove the starting motor commutator cover and inspect the commutator.

To clean the commutator, pull out cable "A," *Illust. 70*, from the magneto coil cover. Remove the starting motor cover band. Depress the starter switch by pulling back on the starter switch lever and, with the starting motor operating, insert a piece of No. 00 sandpaper over the commutator to clean off dirt and discoloration. *Never use emery or carborundum cloth.* Always blow out the commutator compartment after cleaning.

Lubrication

The starting motor has oil-less type bushings at both the commutator and drive ends and requires no lubrication except when the starting motor is removed for service repairs.

At this time it is recommended that a few drops of light engine oil be applied to both bushings.

Removing Starting Motor

1. Disconnect the ground cable from the battery.
2. Remove the battery cable and the ammeter cable from the terminal on the starting motor switch, *Illust. 70*.
3. Remove the two cap screws which hold the starting motor to the crankcase and lift the complete starting motor forward and away from the engine.

To install the starting motor, reverse the removal procedures.

The Fuse

A cartridge type 3-AG, 20 amperes fuse is located on the light switch, *Illust. 64*. It is important to use the same capacity fuse for replacement. If the lights fail, check the fuse. If the fuse continually burns out, check the electrical wiring for short circuits.

Light Bulbs

Tractor lights require 6-8 volt, 32 candlepower single-contact type bulbs, IH No. 27369-D (Mazda 1133).

Storage Batteries

Electrical energy is obtained through chemical action and stored in the battery to be used for starting the engine or for furnishing lights. It is not the source of electricity but only a storage reservoir for use when the generator is not running. In starting for instance, the battery supplies the energy but as soon as the engine starts, the generator begins to replace the electricity taken from the battery.

FARMALL CUB

You will receive the maximum of satisfactory service from your battery by closely adhering to the following simple precautions and service operations.

A registration card is furnished with the battery. The purchaser of a new battery should take the card to the nearest authorized battery service station for registration.

Complete instructions for dry batteries (used for export) are included with battery.

Cleaning and Servicing the Battery—Battery cable terminals must be kept clean and tight. Use hot water for cleaning the top of the battery. Brighten terminal contact surface with wire wool, and re-assemble. Be sure terminals are clamped tightly and that battery is fastened securely in the battery box. Replace unserviceable cables. Keep the vent holes in the battery filler caps open.

Liquid Level—The electrolyte (acid and water) in each cell should be $\frac{3}{8}$ inch above the separators at all times to prevent battery failure. When the electrolyte is below this level, pure distilled water should be added. If your battery is equipped with automatic liquid leveling devices follow the directions furnished with the battery or consult your International Harvester dealer. Never use hydrant water or any water which has been in a metal container. Keep pure distilled water in a glass jar on hand for battery use only. Use a clean syringe when adding water and be careful not to allow dirt or corrosion salts to enter the cells.

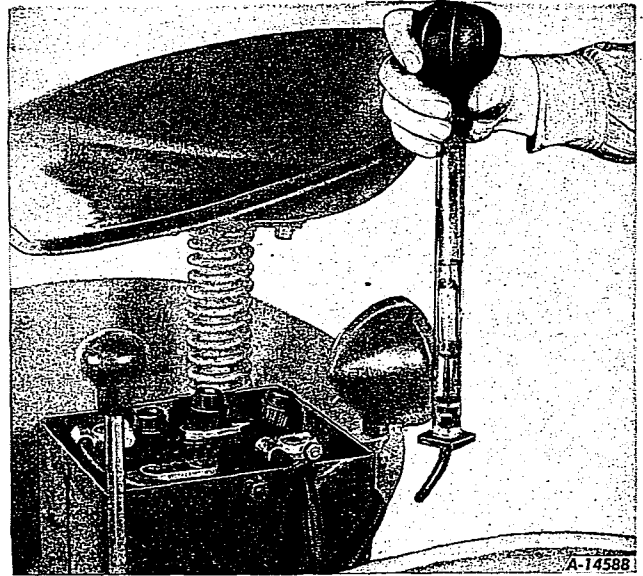
Acid or electrolyte should never be added except by a skilled battery man. Under no circumstances add any special battery "dopes," solutions or powders.

Caution: Do not lay any tools across the battery terminals as it may result in a flash or short circuit. Be careful to avoid spilling any electrolyte on the hands or clothing.

The specific gravity of the electrolyte indicates the relative condition of the battery charge and warns when it may be necessary to increase the generator charging rate, or recharge the battery.

Inspect the battery once every two weeks to maintain the correct specific gravity. The specific gravity of a fully charged battery is 1.275 to 1.300 corrected to 80° F. (liquid temperature). A specific gravity reading of at least 1.250 corrected to 80° F. should be maintained. Never allow the battery to fall below 1.225, which indicates half discharged.

The specific gravity reading will vary with the temperature of the liquid. For instance, a fully charged battery showing a reading of 1.280 at 80° F. will show 1.268 when electrolyte temperature is 110° F. and 1.312 when electrolyte temperature is 0° F.



Illust. 71—Taking a Hydrometer Reading of Electrolyte in the Battery.

Use an accurate hydrometer when testing for specific gravity. Readings should not be taken immediately after adding water.

All cells should show approximately the same specific gravity reading. Wide variations indicate something is wrong.

See your International Harvester dealer or authorized battery service station.

Battery Voltage—With the battery fully charged and on charge at the normal rate, the average cell voltage at 80° F. ranges between 2.5 and 2.7 volts; at 100° F. between 2.4 and 2.6 volts.

Cold Weather Operation—It is especially important to keep the battery close to full charge for cold weather operation. Add water to the battery in freezing temperatures only when the tractor is to operate for several hours, to thoroughly mix the water and the electrolyte, or damage to the battery will result caused by the water freezing.

The electrolyte of a battery in various stages of charge will start to freeze at temperatures indicated below:

Specific Gravity (Corrected to 80° F.)	Freezing Temperature Degrees Fahrenheit
1.250— $\frac{3}{4}$ charge.....	62° F. Below zero
1.200.....	16° F. Below zero
1.150.....	5° F. Above zero
1.100.....	19° F. Above zero

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The above temperatures indicate the approximate points at which the first ice crystals begin to appear in the solution. The solution does not freeze solid until a lower temperature is reached. A $\frac{3}{4}$ charged battery is in no danger of damage from freezing. Therefore keep battery better than $\frac{3}{4}$ charged, *especially during winter weather.*

If your tractor is not to be operated for any length of time during the winter months, it is advisable to remove the battery and store it in a cool dry place above freezing (32° F.)

Place the battery on a rack or bench.

Check the battery at least once a month for water level and specific gravity. If battery shows need of charging it should be given immediate attention. Keeping the battery fully charged not only adds to its life but makes it available for instant use when needed.

Valve Clearance Adjustment

Check the valve clearance after every 400 hours of operation and adjust the clearance, if necessary. A clearance of .013-inch measured when valves are closed and engine is cold, is necessary between tappet adjusting screws and valve stems.

1. Before checking the valve clearance, "cut out" the magneto by pulling cable "B," *Illust. 57*, out of socket. This will safeguard against accidentally starting the engine.

2. Remove the valve cover from left side of crankcase.

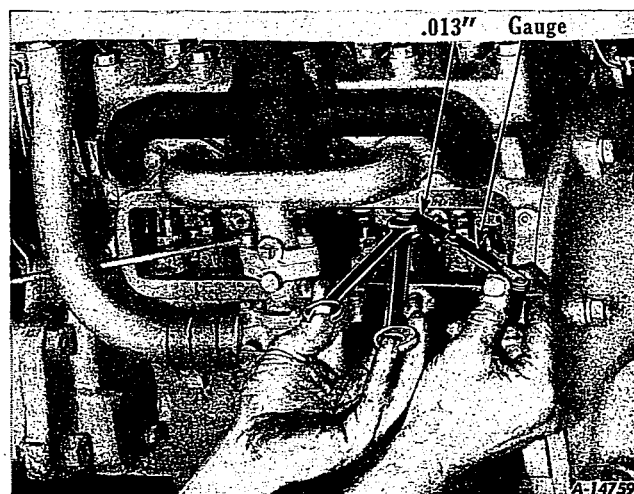
3. Remove the spark plug from the No. 1 cylinder (the cylinder next to the radiator).

4. Place your thumb over the spark plug opening and slowly crank the engine until an outward pressure can be felt. (Pressure indicates No. 1 piston is moving toward upper dead center of the compression stroke.)

Continue cranking slowly until the notch on the fan drive pulley (on the crankshaft) is in line with the timing pointer in front crankcase cover, *Illust. 58*. Both valves are now closed on compression stroke of No. 1 cylinder.

5. Use two thin wrenches when adjusting valve clearance, *Illust. 72*. Use the lower wrench to hold the tappet and the upper wrench to raise or lower the tappet adjusting screw. A gauge of .013-in. thickness should slip snugly between the valve stem and the tappet adjusting screw.

6. Crank the engine one-half revolution at a time and check the clearance of each cylinder's



Illust. 72—Adjusting and Checking Valve Clearance.

valves and adjust if necessary. Do this on each set of cylinder valves in succession according to the firing order of the engine, which is 1, 3, 4, 2.

7. Replace the valve cover. Check to see that the valve cover gasket makes an oiltight seal with the crankcase. Replace the gasket if necessary.

8. Replace the magneto cable "B," *Illust. 57*, into socket from which it was removed.

Important! Be accurate—use a feeler gauge for checking the valve clearance.

Minor Engine Service Operations

Cylinder Head Gasket

For most satisfactory results in tightening the cylinder head after installing a cylinder head gasket, tighten down all nuts fairly snug, starting with the row in the center, then going to the others. Retighten in the same order, giving each nut a small part of a turn at a time. Continue this until all nuts are tight. Do not screw one nut down perfectly tight and then go to the next, as you will not obtain an even pressure on the gasket in this manner.

After replacing the cylinder head, it is necessary to insure against leaks by retightening the stud nuts after engine has been operating and the water jacket has become thoroughly heated.

Crankshaft Bearings, Pistons and Rings

We cannot impress too strongly the necessity of having your International Harvester dealer's service-man do the work on replacement of connecting-rod bearings, crankshaft bearings, pistons and rings, and grinding valves.

FARMALL CUB

Engine Clutch

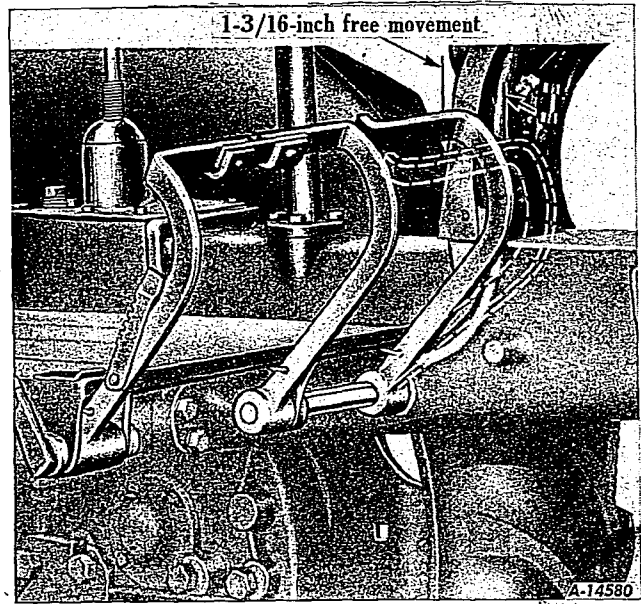
The engine is equipped with a spring-loaded $6\frac{1}{2}$ -inch diameter, single-plate, dry-disc clutch.

Care of the Engine Clutch

The clutch is so designed that it requires a minimum of attention. Lubricate the clutch release bearing after every 1,000 hours of operation or at least once a year as instructed in the "Lubrication Guide" on page 21.

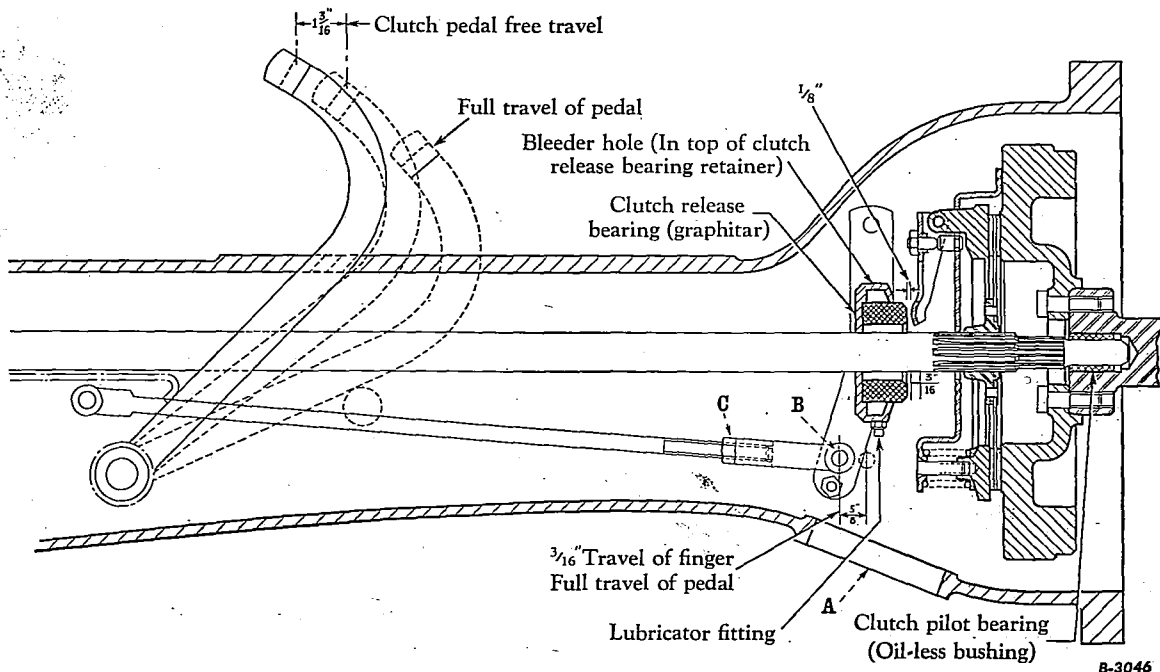
Clutch Clearance

It is very important that the clutch pedal should have a free movement of $1\frac{3}{16}$ inch, *Illusts. 73, 74 and 75*, at which time a clearance of $\frac{1}{8}$ inch will be maintained between the clutch release bearing and the clutch release levers. As the clutch wears, this free movement decreases and adjustment should be made. The clutch may be badly damaged unless a free movement of the foot pedal is maintained. The correct free movement can be maintained by adjusting the length of the clutch operating rod. To adjust the length of the rod, remove the clutch housing handhole cover "A," *Illusts. 74 and 75*, and remove the pin "B" from the clutch operating rod adjusting yoke. Loosen the lock nut "C" (behind the yoke) and turn the yoke in, thereby shortening



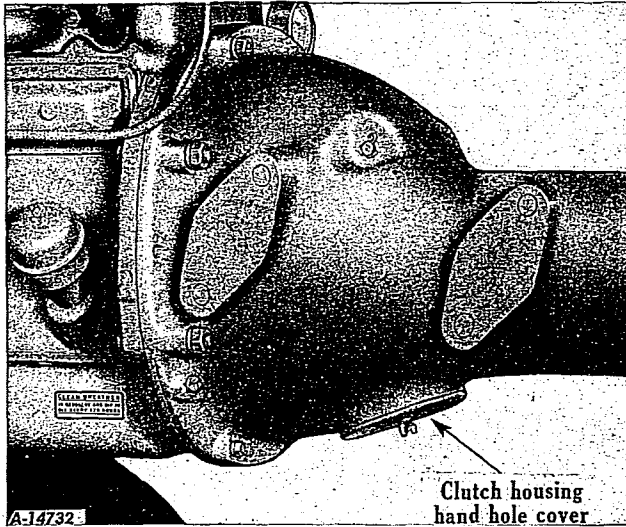
Illust. 73—Clutch Pedal Free Movement.

the control rod until correct free movement is obtained, then tighten the lock nut "C." Replace the adjusting yoke pin "B" and secure with cotter pin. Replace the clutch handhole cover "A."



Illust. 74—Clutch and Connections.

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Illust. 75—Location of Clutch Handhole Cover.

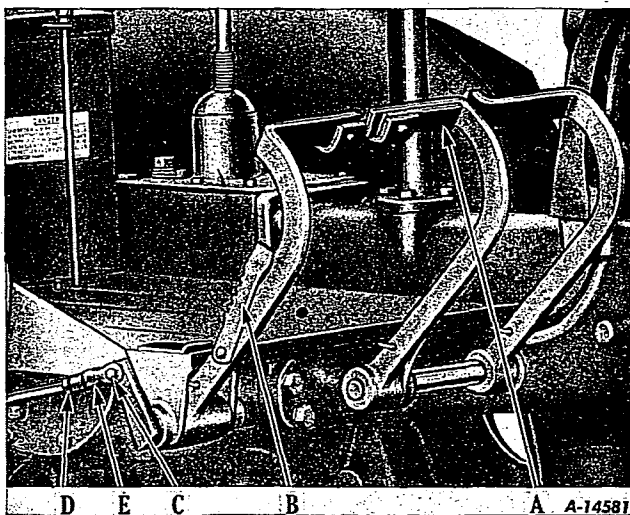
Brakes

The brakes consist of external bands that contract on drums. The brakes are controlled by foot pedals which can be operated individually or simultaneously when locked together.

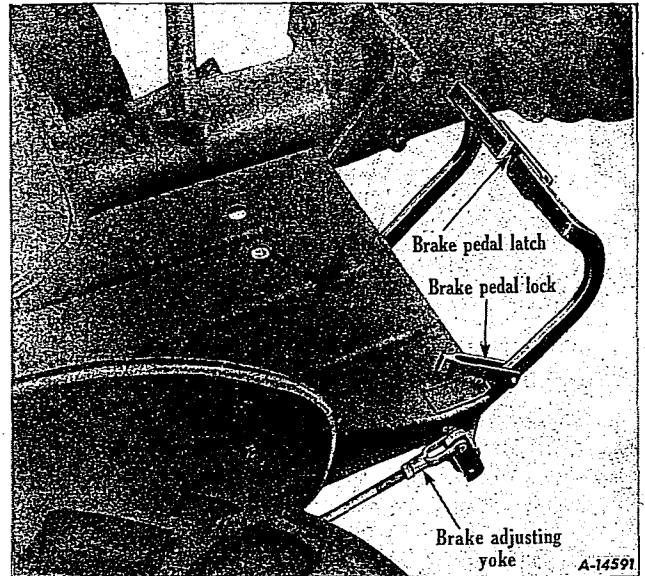
Always lock the brake pedals together with latch "A," *Illusts. 76 and 77*, when traveling in high gear.

Adjustment

To adjust the brakes, jack up the rear end of tractor; remove pin "C" and loosen lock nut "D." Turn the adjusting yoke "E" until each wheel drags slightly, *Illusts. 76 and 77*.



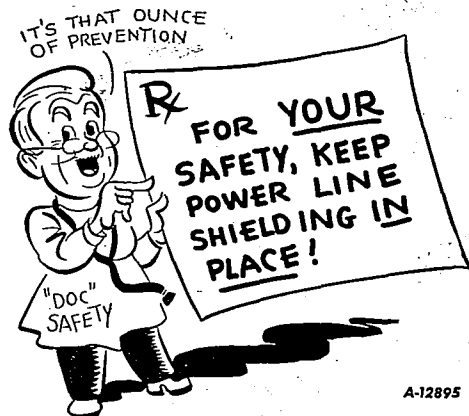
Illust. 76—Brake Pedals Unlatched to Assist in Turning.



Illust. 77—Brake Pedals Latched Together and Lock Engaged to Hold Tractor in a Stationary Position.

Replace pin "C" and tighten lock nut "D" after adjustment has been completed.

It is very important that both brake pedals have the same amount of free movement to obtain brake equalization. A definite way to check equalization of brakes is to jack up both rear wheels so they will turn freely. Block the tractor securely and latch the brake pedals together; then start the engine. Operate it either in second or third speeds. Application of the brakes should slow down both wheels at the same time and also tend to reduce the speed of the engine. If, when brakes are applied, one wheel stops and the other one continues to revolve, loosen the adjustment on the wheel that stops until both wheels stop simultaneously when the brakes are applied.



When tractor is pulling power equipment, be sure that all power line shielding is in place and in good order.

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Drawbar and Hitch

Do not attempt to pull when drawbar is removed.

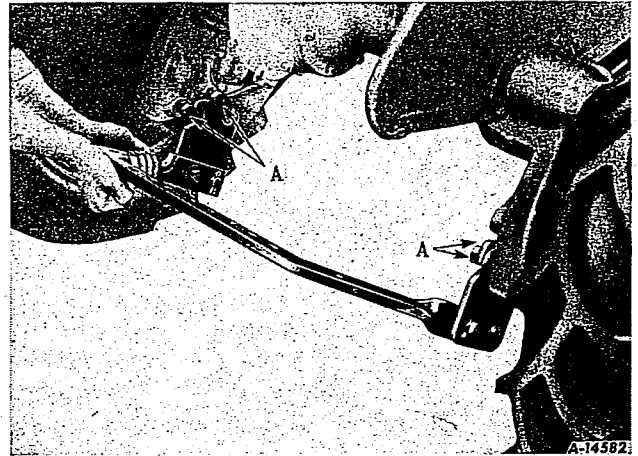
Drawbar bolts must be kept tight.

All hitches for trailing implements must be attached to the drawbar.

The tractor exerts its pulling power on pull-behind implements by means of the drawbar which is adjustable up and down to accommodate different hitches. Proper hitching will save both the tractor and the implement it is pulling from undue strains. Make the hitch so that the center line of pull of the tractor will fall in line with, or at least near the center line of draft of the hitched-on implement. Hitching to one side or the other of the line of draft will cause stresses and strains on both the tractor and the implement being pulled, frequently great enough to do permanent damage. Incorrect hitching will also tend to make the tractor difficult to steer and will result in unsatisfactory work by the implement being pulled.

When using a long chain to hitch the tractor to the load, drive the tractor forward slowly until all slack is taken out of the chain.

The quick attachable drawbar can be easily removed, or reversed and placed in the forward position. To remove the drawbar, loosen bolts



Illust. 78—Removing the Drawbar.

"A," Illust. 78, and unhook the complete drawbar.

Adjustment of Drawbar

The drawbar can be set at three different heights to obtain the proper hitch position.



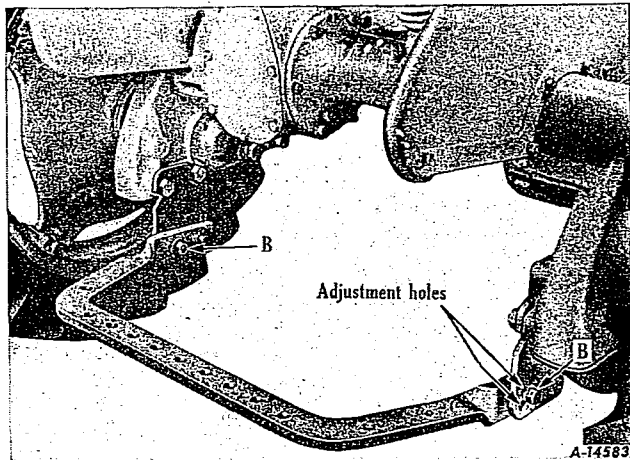
Always hitch to the tractor drawbar, and when pulling a heavy load, pull stumps, rocks, or fence posts—don't take up the slack of the chain with a jerk.



Never stand between the tractor and the drawn implement when hitching.

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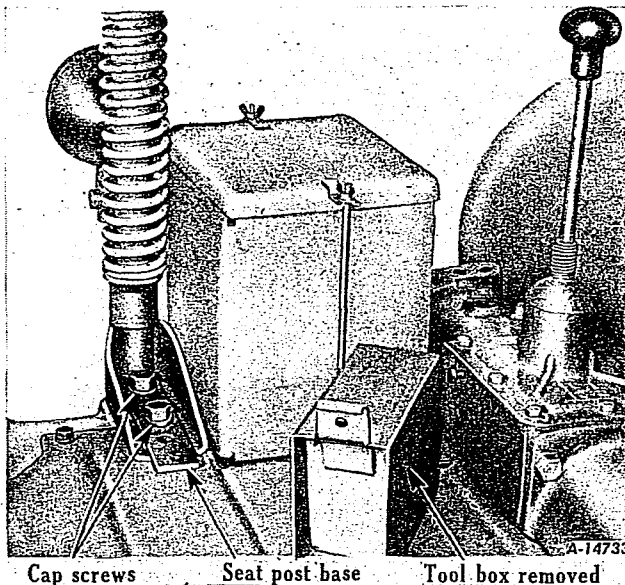
To raise or lower the drawbar, remove the bolts "B," *Illust. 79*, and raise or lower the drawbar to the upper or lower hole in the drawbar bracket. Replace bolts "B" and tighten securely.



Illust. 79—Drawbar Adjustment.

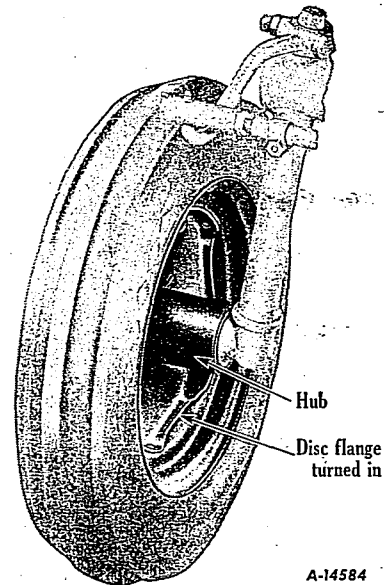
Seat

The tractor seat can be set in either of two positions by removing the tool box and changing the position of the two cap screws in the seat post base, *Illust. 80*, giving a total adjustment of $1\frac{1}{2}$ inches. Tighten cap screws securely when reassembling and replace the tool box.



Illust. 80—Seat Set in Forward Position.

Wheels

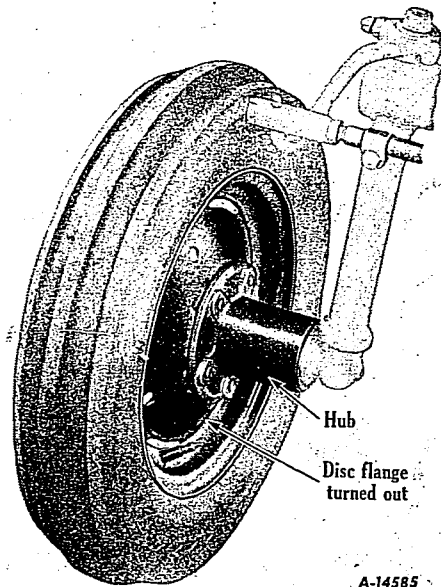


Illust. 81—Front Wheel with Disc Flange Turned In.

Front Wheels

The front wheels are steel disc wheels with attached rims for 3.00-12 or 4.00-12, 2-ply tractor type tires.

Each wheel is mounted on the hub with five special bolts and may be mounted with the disc flange turned in or out to obtain different treads as described on *page 44*.



Illust. 82—Front Wheel with Disc Flange Turned Out.

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The hubs rotate on tapered roller bearings. An oil seal and felt washer are used at the inner end of the hubs.

Adjusting and greasing—The front wheels can be adjusted to treads of $40\frac{5}{8}$ inches or $46\frac{1}{2}$ inches. The wheels are in the $40\frac{5}{8}$ inch tread position when the disc flanges are turned in, *Illust. 81*. To obtain the $46\frac{1}{2}$ -inch tread, reverse the wheels on the hubs so that the disc flanges are turned out, *Illust. 82*.

Rear Wheels

The rear wheels are steel disc wheels with demountable rims for tractor type agricultural tread tires.

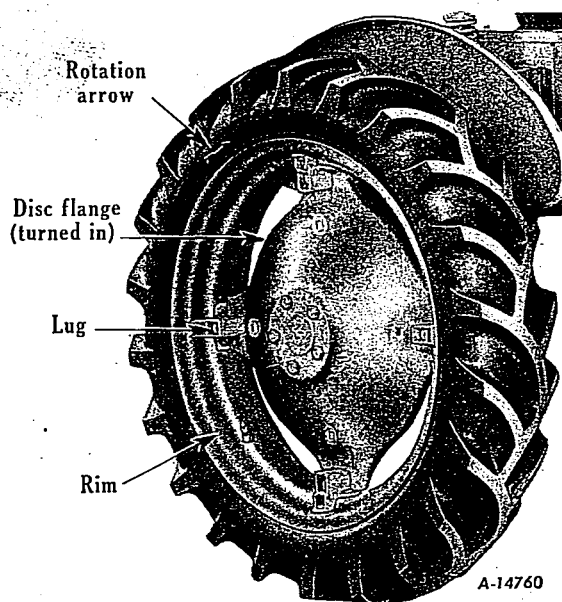
Rims—The following rear wheel rims are available:

Rear wheel rim W5-24 for use with 6-24 (2 ply) pneumatic tires.

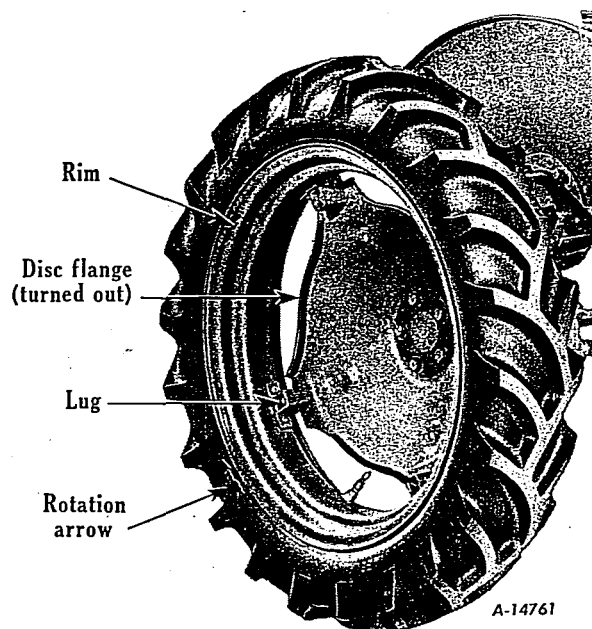
Rear wheel rims W6-24 for use with 7-24 (2 ply) pneumatic tires.

Rear wheel rim W7-24 for use with 8-24 (4 ply) pneumatic tires.

The W6-24 and W7-24 rims are furnished with the tractor when ordered.



Illust. 83—Rear Wheel with Disc Flange Turned In.



Illust. 84—Rear Wheel with Disc Flange Turned Out.

Each wheel is mounted on the axle flange with five special bolts and may be mounted with the disc flange turned in or out to obtain, with the different rim positions, the various wheel treads as described below.

Both the front and rear wheels are provided with mounting holes for the addition of cast iron wheel weights.

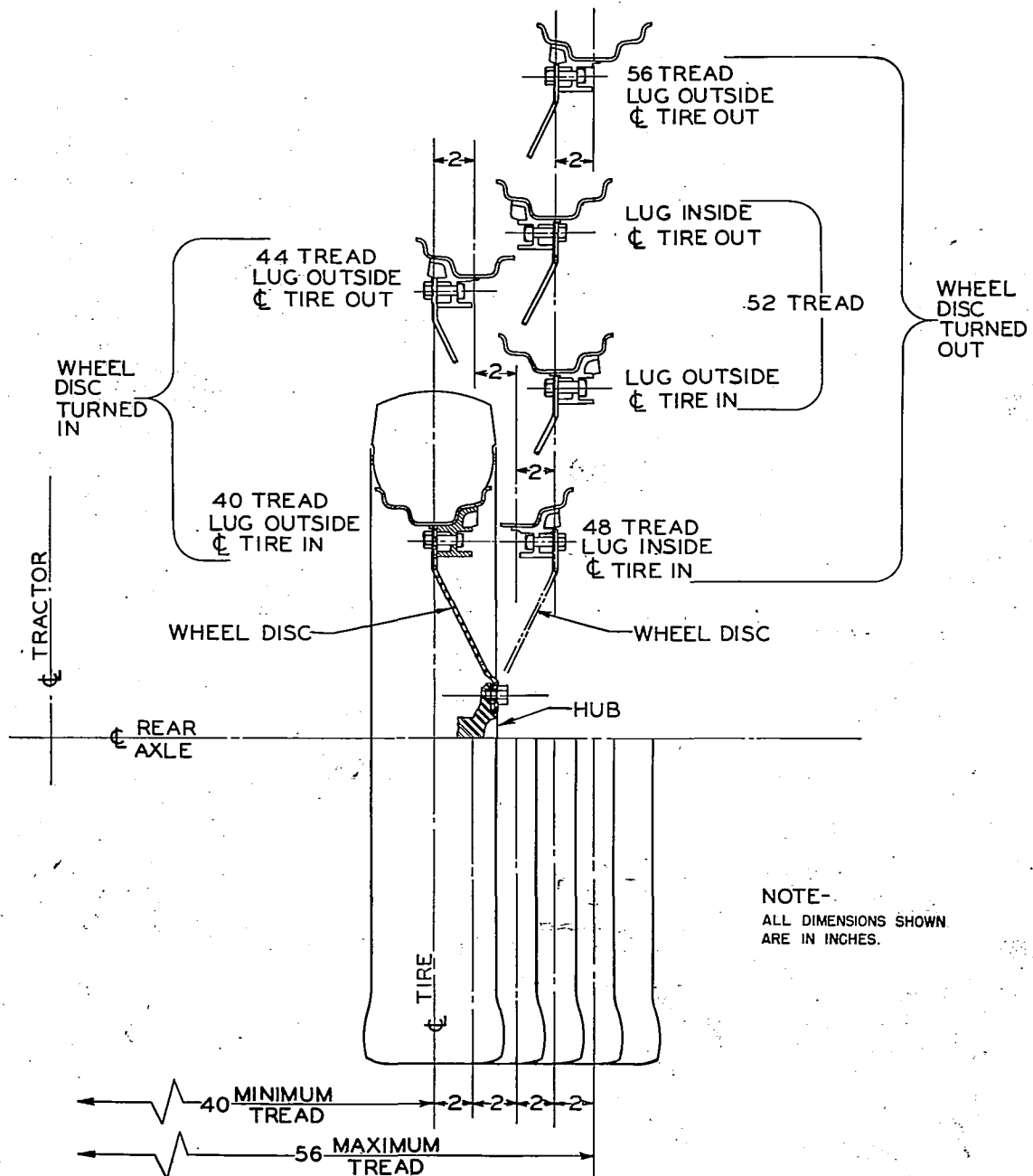
Tread adjustment—The rear wheels can be set in five different tread positions of 40, 44, 48, 52 or 56 inches to suit various crop spacings.

The desired tread position can be obtained by reversing the rear wheel discs and by attaching the rims to the discs in different positions as shown in *Illusts. 83, 84 and 85*.

Note: When the rear wheel discs or rims are reversed, make sure that the tire tread will rotate in the correct direction as shown by the arrow on the side of the tires, *Illusts. 83 and 84*.

When assembling discs or rims, tighten all bolts securely.

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Illust. 85—Rear Wheel Tread Positions.

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Adjustable Front Axle

If your tractor is equipped with an adjustable front axle, the front wheels can be set at treads of $40\frac{5}{8}$, $44\frac{5}{8}$, $48\frac{5}{8}$, $52\frac{5}{8}$ and $56\frac{5}{8}$ inches to track with respective rear wheel tread positions.

To Adjust the Tread Widths

1. Raise the front end of the tractor.
2. Loosen the bolts holding the axle extension clamps "A."
3. Pull out the cotter pins and remove the axle extension clamp pins "B." Remove the bolts from the tie rod clamps "C."
4. Pull the axle extensions out an equal distance on both sides to the desired tread position and move the tie rods "D" to correspond.
5. Replace the axle extension clamp pins "B" in the holes selected and tighten the clamps. Also replace and tighten the bolts in the tie rod clamps.

Front wheels should have $\frac{1}{8}$ -inch to $\frac{1}{4}$ -inch "toe-in" ($\frac{1}{8}$ -inch closer in front than rear), measurements being taken from the inside of the front wheels at "F" and "G" respectively, *Illust. 86*.

To adjust "toe-in," disconnect the steering knuckle arms "E" at "D," loosen the lock nuts and turn the tie rod ends "D" in or out as required.

Be sure to make the arm adjustments equal.

Pneumatic Tires

Follow the instructions and recommendations shown below in order to secure maximum life and efficient service from the pneumatic tires.

Inflation

Keep the pneumatic tires properly inflated to the pressures shown in the chart below. Underinflation will damage the tire cord body and may cause the tire to slip on the rim and tear out the tube valve stem. Overinflation results in excessive slippage, causing rapid tire wear.

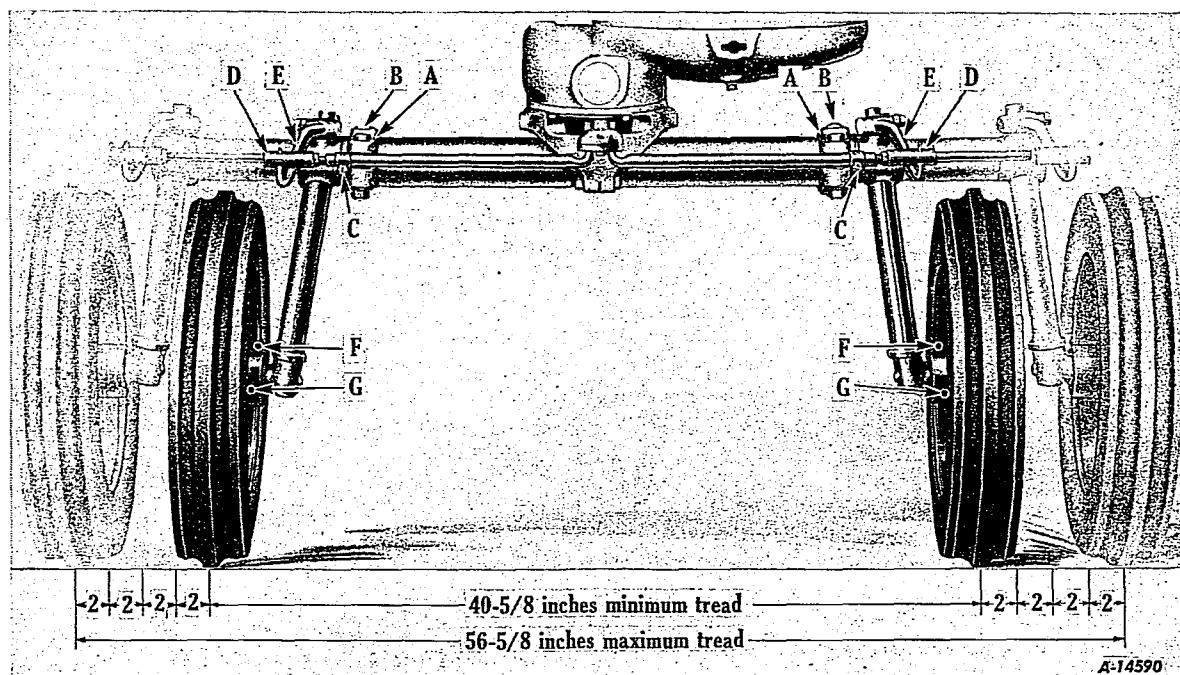
Check the air pressure once a week with an accurate low-pressure gauge having one-pound graduations. Do not allow the air pressure to drop below the recommendations.

Tires can be inflated with a pressure pump, hand pump, or a spark plug pump. Spark plug pumps can be purchased from International Harvester dealers.

Always see that tire valve caps are in place and screwed tightly. The caps prevent the loss of air through the valve core, and also prevent loose soil, mud, gravel, snow, and ice from entering and damaging the valve core and air chamber in the tires.

Shipping Tractors Equipped with Pneumatic Tires

When tractors are transported on a carrier, such as railroad cars or trailers, inflation pressures should



Illust. 86—Adjustable Front Axle Showing Variable Wheel Treads.

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be as follows to make possible rigid blocking and to prevent bouncing:

- All 2-ply front tires.....20 lbs.
- All 2-ply rear tires.....20 lbs.
- All 4-ply rear tires.....30 lbs.

Important: Deflate the rear tires to the correct operating pressure and check the front tires before the tractor is transported under its own power, towed, put into service, or placed in storage for any length of time; otherwise, the rubber will check or crack.

When towing tractors, do not exceed a speed of 20 miles per hour.

Operating Pressure for Low-Pressure Tractor Tires

Caution! Adjust air pressure in tires as indicated below immediately upon receiving your tractor.

FRONT AND REAR TIRES	Lbs. Per Sq. In.	KG CM ²
FRONT		
2-Ply Tires.....	20	1.40
REAR		
2-Ply Tires.....	12	.84
4-Ply Tires.....	12	.84
When plowing, increase the pressure in tire on <i>furrow wheel only</i> , to.....	16	1.12
When wheel weights are used, or implements are carried on the tractor, inflation pressure must be increased, see tire and rim association schedule or contact your International Harvester dealer.		

Mounting Tires on the Rim

After mounting a new or old tire on rim, inflate all 2-ply tires to 20 lbs. and all 4-ply tires to 30 lb. pressure to seat the tire bead on the rim flange and to prevent the tire from creeping and shearing off the valve. Then deflate or inflate the tire to the correct operating pressure.

Traction and Weights

The recommended air pressures are shown above. Tractor should not be operated with tires improperly inflated. To insure the maximum hours of service, watch the tread lugs. If they wear down too fast, immediately add more weight to reduce slippage. Check for high air pressure.

(See your International Harvester dealer for information.)

Wheel Weights

The drawbar pull of a tractor can be increased by the addition of weight to the driving wheels, either by adding cast-iron weights to the wheels, or by the use of liquid in the tire tube.

The amount of the increase in drawbar pull by the addition of certain definite weights varies with the type of soil. When very heavy weight is required, both liquid and cast-iron weights can be used.

Overloading

Do not load tires beyond their rated capacity. In adding weights, consideration must be given so as not to exceed the load capacity of the tire.

After adding weight to the rear wheel it may be necessary to readjust the height of drawbar to get the correct alignment.

Liquid Weight

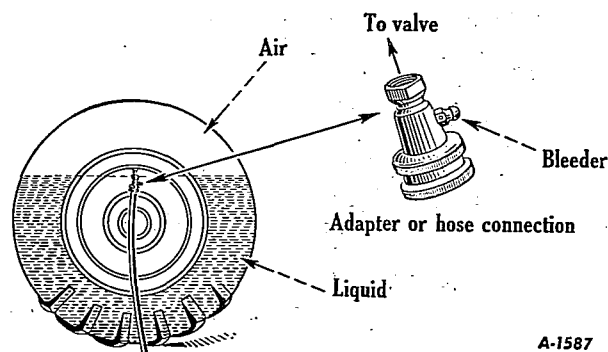
Tractor tire tubes can be filled $\frac{3}{4}$ full with liquid, using clean water for temperatures above freezing (32° F.). A calcium chloride solution (CaCl₂) is recommended when operating in freezing temperatures.

Methods of Putting Liquid into Tube

Purchase an adapter, *Illust. 87*, from your International Harvester dealer. The adapter is provided with a bleeder for letting out the air displaced by the liquid.

Jack up the tractor and revolve the tire until the valve stem is on top. Remove the valve core housing and screw on the adapter, then attach water hose to adapter.

The liquid can be injected into the tube from a tank placed at least five feet higher than the tire, by using a hand force pump or by using compressed air and a pressure tank filled with liquid.



A-1587

Illust. 87—Tires Three-quarters Full of Liquid.

FARMALL CUB

Remove the hose and adapter; then replace the valve core housing, and inflate tire to the correct operating pressure.

Liquid Weight for Freezing Temperatures

Calcium chloride solution, using a 25% mixture, which is approximately 20 lb. of flaked calcium chloride to 10 U. S. gallons of water, is recommended when freezing temperatures prevail.

The strength of the solution can be checked with a battery hydrometer. A 25% solution measures approximately 1.225 specific gravity and has a freezing point of 25° below zero.

Caution! Some calcium chloride flakes have an acid reaction. It is advisable to add 1 pound of lime to each 100 pounds of calcium chloride used.

When preparing calcium chloride solution, always pour the water into the container first; then add the correct amount of calcium chloride crystals, stirring the mixture thoroughly. Never pour the water on the calcium chloride flakes. After the solution is mixed, allow it to cool before using.

Valve Stem Mounting Cones or Nuts

Valve stem mounting cones or nuts are furnished with all rear wheel tire tubes having valve stem for inserting liquids, and are mounted on the valve stem at the factory.

The purpose of the cone (or nut) is to hold the valve stem in the valve hole when mounting the tire, particularly when liquid is used in the tire. If the tire is mounted or the liquid inserted without the cone (or nut), the valve stem is very apt to be pulled into the rim and will require much extra work to get it through the valve hole.

Care of Tires

Avoid stumps, stones, deep ruts and other hazards. Cuts in tires should be repaired immediately as neglect decreases the tire life.

Keep tires free from oil and grease as both destroy rubber.

After using the tractor for spraying—insect control work—wash off with water any chemicals that may be on the tires.

Tire Protection During Storage

When not in use store the tractor so that the tires

are protected from the light. Before storing tractor, clean the tires thoroughly. Jack up the tractor so that the load is off the tires, when it is to be out of service for a long period. If it is not jacked up, inflate the tires at regular intervals. Before putting tractor in service, always inflate the tires to correct operating pressures.

Tire Chains

For wet grass or ground conditions, use lug-type chains. The flexing of the tire and creeping of chains will break the mud loose as wheel rotates.

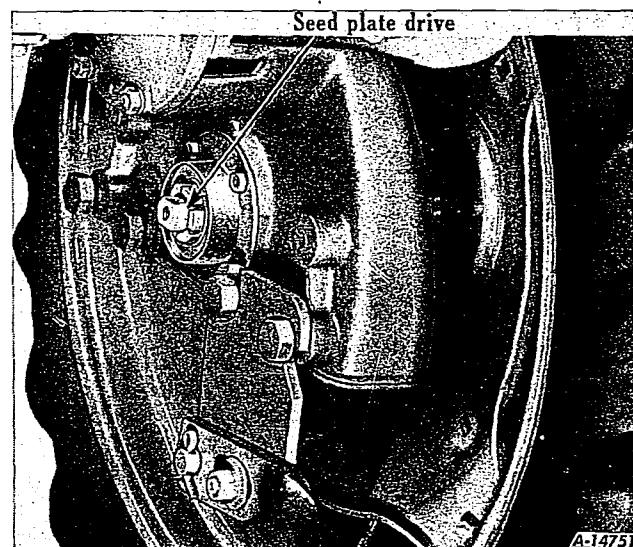
There is a possibility of the tire slipping within the chain; to prevent this, the use of spring type chain fasteners is recommended.

Static Electricity in Tractors Equipped with Pneumatic Tires Doing Belt Work

Static electricity generated by belt work can be discharged harmlessly by attaching a chain to the tractor and letting it touch the ground.

Seed Plate Drive

The seed plate drive, located on the inner side of the right rear axle, *Illust. 88*, furnishes the power for seed planting attachments, also for the sowing of fertilizer. Refer to your implement book for complete instructions.



Illust. 88—Location of Seed Plate Drive.

MAINTENANCE

Trouble Shooting

Hard to Start

Possible Cause	Possible Remedy
No gasoline in fuel tank or carburetor.....	Fill tank with new gasoline, open fuel shut-off valve. Check fuel lines, fuel strainer and carburetor.
Gasoline strainer or fuel lines clogged.....	Clean fuel strainer, check fuel lines and carburetor.
Impulse coupling inoperative.....	Flush with kerosene, <i>refer to page 31.</i>
Water in gasoline.....	Drain fuel tank and carburetor. Use new fuel, and dry spark plugs or see your dealer's serviceman.
Water in cylinders.....	Check cylinder head gasket or look for clogged drain hole in exhaust manifold or muffler.
Choked improperly. Flooded engine.....	Follow starting instructions, <i>page 8.</i>
Defective ignition or loose wiring.....	Check wiring, plugs and magneto, etc., <i>refer to pages 29 to 32.</i>
Defective battery or starting motor.....	Check and service, <i>refer to page 37 or replace.</i>
Spark plugs dirty or improper gap.....	Clean, adjust gap to .023", or replace plugs.
Magneto grounded.....	Pull out on ignition switch. Check for other possible ground, also refer to magneto instructions, <i>page 30.</i>
Engine speed control not advanced.....	Advance lever $\frac{1}{8}$ for starting.
Lack of compression.....	See your dealer's serviceman.
Flywheel ring gear teeth broken.....	See your dealer's serviceman.
Too heavy grade of lubricating oil.....	Drain and refill with proper lubricant. <i>Refer to "Lubricant Specifications," page 17.</i>
Gears engaged.....	Put gear shift in neutral.
Internal seizure.....	See your dealer's serviceman.

Engine Operates Irregular or Knocks

Engine incorrectly timed.....	Retime. See "Magneto," <i>page 32.</i>
Spark plugs dirty; wrong gap or wrong type.....	Clean; reset gap to .023" or replace.
Poor or weak spark.....	Check magneto if spark is good from coil. Check distributor points and gap; spark plugs, and wiring, <i>see page 29.</i>
Carburetor setting incorrect.....	Adjust as per "Carburetor" instructions; <i>page 24.</i>
Poor grade fuel or water in fuel.....	Drain and use a good grade of clean fuel.
Engine overheating.....	Check cooling system and fan belt, see instructions "Engine Overheats".
Engine valves at fault.....	Check valve clearance or see your dealer's serviceman.
Air leaks around intake manifold.....	Check gasket and tighten nuts.
Engine smokes.....	Check air cleaner oil level. Check fuel delivery at carburetor. Check for worn piston and rings or see your dealer's serviceman.
Excessive carbon in engine.....	See your dealer's serviceman.
Loose piston pin or bearings.....	See your dealer's serviceman.
Broken rings or loose pistons.....	See your dealer's serviceman.
Worn connecting rod and main bearings.....	See your dealer's serviceman.
Governor sticking or needs adjustment.....	See your dealer's serviceman.

Lack of Power

Engine speed lever not advanced.....	Advance speed control lever.
Engine cold or overheated.....	Run engine until it warms up before putting under load. Check cooling system or see your dealer's serviceman.
Engine overloaded.....	Reduce load.
Engine knocks excessively.....	Use good fuel; also check timing or see your dealer's serviceman.
Governor not working properly.....	See your dealer's serviceman.
Poor compression.....	Service valves and piston rings, or see your dealer's serviceman.
Poor fuel or too lean a mixture.....	See carburetor instructions, <i>page 24.</i>

FARMALL CUB

Possible Cause	Possible Remedy
Fuel lines or strainer obstructed.....	Clean, <i>page 25</i> .
Fuel tank air vent closed.....	Open vent in cap.
Exhaust pipe clogged.....	Clean out.
Air cleaner clogged or air leakage between carburetor and engine.....	Clean air cleaner as instructed on <i>page 28</i> . Tighten carburetor and manifold mounting nuts.
Too heavy oil in crankcase or air cleaner.....	Drain and refill with proper lubricant. Refer to <i>lubricant specifications, page 17</i> .
Incorrect timing or faulty ignition.....	See "Magnet," <i>page 32</i> .
Clutch slipping.....	Adjust pedal free travel, <i>page 40</i> , or see your dealer's serviceman.
Brakes drag.....	Adjust brakes, <i>page 41</i> .

Engine Overheats

Cooling system clogged or limed.....	Clean system, <i>refer to page 26 or see your dealer's serviceman</i> .
Fan belt slipping.....	Adjust or replace belt, <i>refer to page 27</i> .
Insufficient water in cooling system.....	Fill radiator to proper level, <i>refer to page 26</i> .
Radiator cores clogged.....	Remove all chaff or dirt from the radiator grille, clean with a hose if available.
Wrong kind of fuel.....	Change to a good grade of gasoline.
Carburetor improperly set.....	Refer carburetor, <i>page 24</i> .
Timing incorrect.....	Check per "Magnet" instructions, <i>page 32</i> .
Breaker point gap incorrect.....	Adjust gap per "Magnet" instructions, <i>page 30</i> .
Excess load.....	Reduce load.
Excess carbon in engine.....	See your dealer's serviceman.

No Oil Pressure, Too High or Too Low

Defective oil gauge.....	Replace or see your dealer's serviceman.
Wrong grade, diluted or insufficient oil.....	Refer to <i>lubricant specifications, page 17</i> . Check oil level; if diluted, replace with fresh oil, refer to operating instructions.
Broken, loose or plugged oil lines.....	Clean and tighten or see your dealer's serviceman.
Low oil level in crankcase.....	Add oil, refer to "Lubrication Guide". Check for oil leak.
Defective or dirty oil pressure regulating valve.....	See your dealer's serviceman.
Oil pump strainer clogged or pump not working.....	Clean as instructed on <i>page 14 or see your dealer's serviceman</i> .
Worn bearings.....	See your dealer's serviceman.

Oil Dilution or Uses Too Much Oil

Incorrect grade of oil.....	<i>Refer to lubricant specifications, page 17</i> .
Leaks in oil lines or filter, or oil pan plug or gasket....	Check and tighten or see your dealer's serviceman.
Worn piston or oil rings.....	See your dealer's serviceman.
Loose connecting rod bearings.....	See your dealer's serviceman.
Long engine idling.....	Stop engine.
Engine overheating or too cold.....	Refer to section "Lack of Power and Engine Overheats".
Engine speed too high.....	See your dealer's serviceman.
Crankcase breather clogged.....	Clean screen in top of oil level gauge, as instructed on <i>page 14</i> .

Using Too Much Fuel

Fuel mixture too rich. Carburetor out of adjustment...	Check choke and see Carburetor instructions, <i>page 24</i> .
Fuel leaks.....	Tighten or replace fuel lines or fuel strainer gasket.
Poor grade of fuel.....	Use a good grade of gasoline.
Choke closed.....	Investigate for choke not operating.
Engine overloaded.....	Reduce load or shift to lower speed.
Poor compression.....	See your dealer's serviceman.
Faulty ignition.....	<i>Refer to pages 29 to 39</i> .

MAINTENANCE

Possible Cause	Possible Remedy
Engine not operating at proper temperature.....	Check cooling system. Check lubricating oil or see your dealer's serviceman.
Air cleaner clogged.....	Service air cleaner, <i>page 28</i> .
Incorrect grade or amount of lubricating oil.....	Refer to "Lubricant Specifications," <i>page 17</i> , and keep the oil up to the proper level.

No Fuel at Carburetor

Fuel low in tank.....	Fill fuel tank and check fuel lines.
Air vent hole in fuel tank cap plugged up.....	Clean out vent hole.
Fuel valve closed or partly open.....	Open valve, refer "Starting Instructions," <i>page 8</i> .
Dirty or clogged fuel strainer screen or line.....	Clean as instructed on <i>page 25</i> .

Ignition and Electrical

Wrong kind, old, cracked, dirty, or poorly set spark plugs.....	Clean and set gap to .028" to .032", or replace with new one.
Loose wiring or improper connections.....	Check wiring, to see that all connections are clean and tight, <i>pages 29 to 39</i> .
Magneto not timed correctly.....	Retime as instructed on <i>page 32</i> .
Distributor cap or rotor or breaker chamber dirty.....	Clean as instructed on <i>page 31</i> .
Distributor brush broken.....	Replace brush or see your dealer's serviceman.
Breaker points dirty, pitted or improperly set.....	Clean and reset gap or replace with new, <i>page 30</i> .
Breaker arm stuck, weak or broken spring.....	Check and replace, <i>page 30</i> .
Impulse coupling dirty.....	Clean and lubricate as instructed, <i>page 31</i> .
Battery defective, low charge or loose connections.....	Recharge, clean and tighten cable lugs or replace with new, check ground cable, refer to <i>pages 37 to 39</i> .
Starting motor failure.....	Replace or see your dealer's serviceman.
Generator inoperative.....	Clean commutator, check brushes, <i>page 36</i> , or see your dealer's serviceman.
Generator relay.....	See your dealer's serviceman.
Ammeter inoperative.....	Replace ammeter or see your dealer's serviceman.
Ammeter shows excessive charge.....	Adjust generator charging rate, <i>page 36</i> .
Ammeter shows discharge.....	Check battery and generator, check drive belts and wiring.
Lights will not burn.....	Check battery ground cable. Turn on switch, replace bulbs, replace fuse, recharge battery, check wiring and generator, or see your dealer's serviceman.
Lights burn dim.....	Turn switch to bright. Recharge battery, tighten cable terminals, check bulbs, adjust generator charging rate, clean contacts.

Brakes

Do not hold.....	Adjust brakes, <i>page 41</i> or new lining needed or see your dealer's serviceman.
Drag or uneven.....	Adjust brakes, <i>page 41</i> .
Grease on lining.....	Replace lining or see your dealer's serviceman.
Return spring broken.....	Replace.
Do not release.....	Release brake lock. Be sure that the left-hand brake cross shaft is free to turn.

Transmission, Belt Pulley and Power Take-Off

Hard to shift gears.....	Use correct grade of lubricant, <i>page 17</i> .
Shifter fork or lever defective.....	Replace or see your dealer's serviceman.
Engine clutch drags.....	Refer under "Lack of Power."
Gears clashing.....	Stop tractor and disengage clutch before shifting gears.
Gears slipping out of mesh.....	See your dealer's serviceman.
Noisy.....	Check oil level, use proper grade lubricant or see your dealer's serviceman.
Damaged parts.....	See your dealer's serviceman.

FARMALL CUB

Possible Cause

Possible Remedy

Rear Wheels

Do not turn.....Release brake lock. Transmission or differential or clutch faulty. Refer to "Transmission Section" or see your dealer's serviceman.

Front Wheels

Too tight or too loose.....Check lubricant in bearings, check bearing adjustment, *page 16.*
Lubricant leakage.....Check oil seal or see your dealer's serviceman.

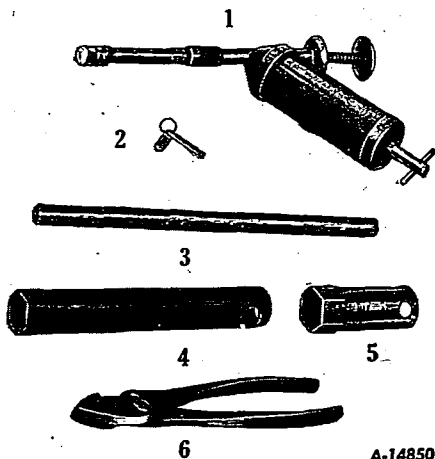
Steering

Faulty.....Check steering worm and gear, check front axle adjustment, *page 46.* Check lubricant in front wheel. Check tire inflation or see your dealer's serviceman.
Defective front axle.....Inspect linkage, check and replace faulty parts or see your dealer's serviceman.
Tractor turns to one side.....Check and adjust brakes evenly, *page 41.* Check pneumatic tire air pressures. Check front axle adjustment, *page 46.*

Pneumatic Tires

Excessive or uneven wear.....Check for toe-in, *page 46.* Check air pressure and check load on tires, *page 47.*
Slippage, rear tire.....Add more weight, and check for high pressure, *page 47.* If tread is badly worn, tires may slip more readily. Replace with new tires or use lug-type chains.

Tools



A-14850

Illust. 89—General Service Tools Furnished with the Tractor.

Ref. No.	Description
1.	Hand lubricator (3-oz. size).
2.	Breaker point and spark plug gauge.
3.	Socket wrench handle.
4.	Socket wrench, 1/2-inch.
5.	Spark plug wrench.
6.	Pliers (8 inches long).

STORING AND HOUSING YOUR TRACTOR

Storing and Housing Your Tractor

When your tractor is not to be used for a period of time, it should be stored in a dry and protected place. To leave equipment outdoors, exposed to the elements, will result in materially shortening the life of the machine.

Follow the procedure outlined below when your tractor is placed in storage, and repeat the lubrication precautions every six months thereafter. We also recommend caution to be practiced in starting an engine that has been in storage.

1. Wash or clean and completely lubricate the tractor (refer to "Lubrication Chart").

2. Drain and flush the cooling system.

3. Oil the magneto impulse coupling liberally with kerosene.

4. After the engine has cooled off, remove the spark plugs and pour one tablespoon of SAE-50 lubricating oil of a good grade into each cylinder. Crank engine 2 or 3 times to distribute oil over the cylinder walls.

5. Remove valve cover and flush valves, and push rods with SAE-50 oil. (If any evidence of rust is found, remove it before lubricating.) Replace valve cover.

6. Plug up the end of the exhaust pipe.

7. Remove the oil filter element. (If any evidence of rust is found on the center stud, clean thoroughly.) Replace the old filter element with a new one and flush out any sludge from filter base as instructed on page 15.

8. Drain the fuel from the fuel tank and carburetor, and clean out the fuel strainer glass bowl.

Caution: Gum will eventually form in tanks, lines and carburetor if unit is not used. Gum in carburetor jets and passages affects engine starting. Gum can be dissolved with acetone or a 50-50 mixture of alcohol and benzol.

9. If the tractor is equipped with a storage battery, remove the battery and place it on a rack in a cool room and check battery at least once a month for water level and specific gravity, page 38.

Starting Engines That Have Been in Storage

1. Remove the spark plugs and pour a mixture of one-half gasoline and one-half light lubricating oil into each cylinder (2 tablespoonfuls per cylinder is enough).

2. Remove the valve cover, and flush the valve and valve operating mechanism with the same mixture.

3. Crank the engine rapidly until excess oil has been blown out of the spark plug holes. This operation will loosen any tight piston rings and wash old gummy oil from valves and pistons.

4. Flush out the impulse coupling with kerosene, and lubricate as specified.

5. Drain the crankcase and flush out with kerosene or flushing oil and fill with specified lubricating oil. (See "Lubrication Chart.")

6. Be sure the lubricating oil filter has a new element before starting the engine.

7. Remove the exhaust pipe plug.

8. Install the spark plugs after cleaning and setting gaps.

9. Fill the water cooling system.

10. Fill the fuel tank.

11. Install a fully charged battery (if used) and be sure the proper connections are made.

12. Clean the air cleaner and refill the oil cup.

13. Start the engine and let it run slowly; observe if any valves are sticking. If so, pour a small quantity of kerosene on the valve stem until loose.

14. Assemble the valve cover.

Caution! Do not accelerate the engine rapidly or operate at high speed immediately after starting.

FARMALL CUB

SPECIAL EQUIPMENT

The Farmall Cub tractor is used for so many different types of work and is called on to operate under so many different conditions that a considerable variety of special equipment is necessary to adapt it to the varied requirements of the user.

The tractor, as regularly supplied, is equipped to perform straight drawbar work. Beyond that the special equipment requirements are so diverse that it is impractical to include any such equipment regularly on the tractor. In many cases you would be paying for equipment you do not need or want.

These special attachments can be installed on the tractor at any time, and once installed become a permanent part of your tractor.

Below is an index of the special equipment available. The instructions for operating and maintaining these attachments have been incorporated into the instructions for operating and maintaining the tractor. Supplemental information will be found in the following pages. You are urged to read and study this information in order to assure satisfactory service.

Special equipment must not be ordered from this manual. To order attachments consult your International Harvester dealer, giving the tractor and engine serial numbers.

TYPES OF EQUIPMENT	ATTACHMENT NUMBER	PAGE NO.
Belt Pulley and Power Take-Off.....	351 233 R91	55, 56
Belt Pulley for Tractors equipped with attachment 351 234 R91.....	351 441 R91	55
Detachable Seat Pad.....	351 440 R91	58
Exhaust Muffler.....	351 435 R91	58
Electric Starting and Lighting.....	351 301 R91	59
Front Axle, Adjustable.....	351 389 R91	60
Front Wheel Weight, First.....	351 368 R91	56
Front Wheel Weight, Second.....	351 369 R91	56
Power Take-Off.....	351 234 R91	55
Rear Wheel Weight, First.....	351 372 R91	56, 57
Rear Wheel Weight, Second.....	351 373 R91	56, 57
Spark Arrester.....	351 642 R91	58
Swinging Drawbar.....	351 429 R91	58
Tire Pump (Enginair) for Pneumatic Tires.....	39 604 DA	57
Tire Pump (Schrader) for Pneumatic Tires.....	39 622 D	57
Tire Pump Kit (Schrader) for Pneumatic Tires.....	350 342 R91	57
Upholstered Seat.....	351 560 R91	60

SPECIAL EQUIPMENT

Belt Pulley and Power Take-Off

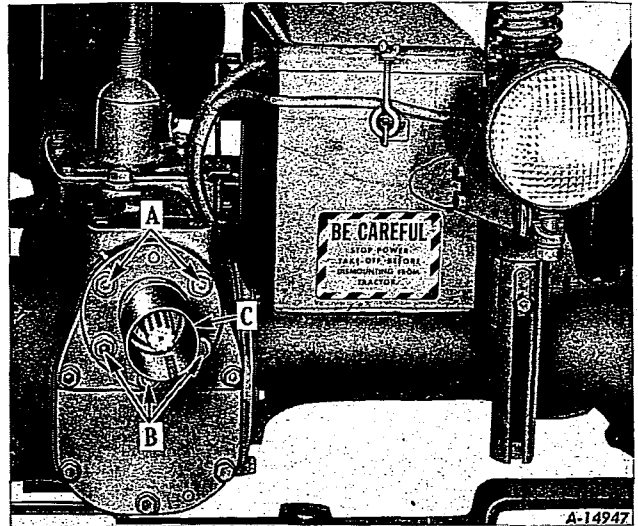
The power take-off attachment, mounted on the back of the transmission case, extends the power of the engine to the rear of the tractor for operating the mower mechanism or the mechanism of other power-driven implements that will fit the Farmall Cub. The power take-off shaft projects through the rear of the differential housing, and is driven by the transmission drive shaft. The power take-off shifter lever engages and disengages the power take-off shaft from the transmission drive shaft; the engine clutch should always be disengaged before moving this shifter lever. The power take-off has a speed of 1600 r.p.m.

The belt pulley attachment, mounted on the power take-off, increases Cub utility by making the power of the tractor engine available for the operation of belt-driven machines such as corn shellers, feed grinders and hammer mills. The belt pulley is driven by the power take-off shaft.

The regular pulley has a 9-inch diameter with a $4\frac{1}{2}$ -inch face. Shaft speed is 1322 r.p.m., which gives a belt speed of 3114 feet per minute. There is another pulley available that has a $7\frac{5}{8}$ -inch diameter with a $4\frac{1}{2}$ -inch face. This pulley, with a shaft speed of 1322 r.p.m., gives a belt speed of 2638 feet per minute.

The belt pulley and power take-off may be had as a unit or the power take-off may be had separately. The belt pulley attachment is also supplied separately for tractors that are already equipped with a power take-off attachment.

The instructions for operating the belt pulley and power take-off attachments are on page 13. For lubrication see page 20.



Illust. 91—Power Take-Off Assembled on Tractor.

To Change from Belt Pulley Work to Power Take-Off Work

Remove the two $\frac{3}{8}$ N.C. x $1\frac{5}{8}$ -inch cap screws "A," Illust. 90, and the three $\frac{3}{8}$ N.C. x $1\frac{3}{8}$ -inch cap screws "B" and remove the belt pulley and housing complete. Set the belt pulley and cap screws aside for future use.

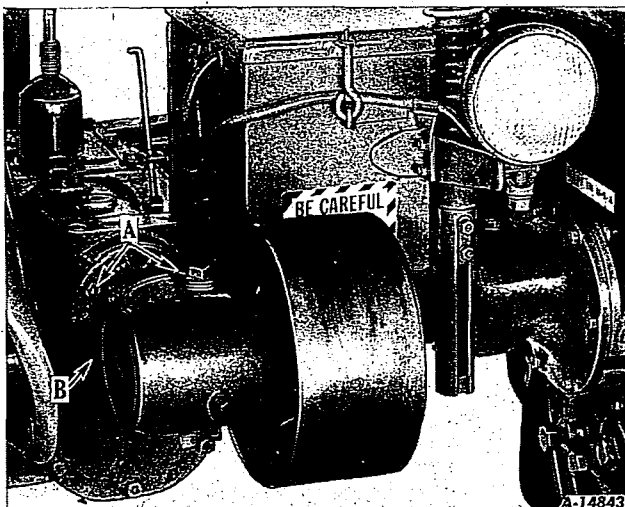
Replace the removed cap screws with the cap screws originally supplied with the power take-off attachment. Use the two $\frac{3}{8}$ N.C. x $1\frac{1}{4}$ -inch cap screws at "A," Illust. 91, and the three $\frac{3}{8}$ N.C. x 1-inch cap screws at "B." Use the flat washers and lock washers provided with the cap screws and tighten securely.

Always cover the power take-off exposed shaft with the guard "C," Illust. 91, when the power take-off is not being used.

Power take-off shaft speed is 1600 r.p.m. (counter-clockwise rotation).

To Change from Power Take-Off Work to Belt Pulley Work

Remove the two $\frac{3}{8}$ N.C. x $1\frac{1}{4}$ -inch cap screws "A," Illust. 91, and the three $\frac{3}{8}$ N.C. x 1-inch cap screws at "B." Apply a light coating of grease to the power take-off shaft and female spline in the belt pulley housing. Then slide the belt pulley and housing complete on to the power take-off splined shaft.



Illust. 90—Belt Pulley and Power Take-Off Assembled on Tractor.

FARMALL CUB

Insert the two $\frac{3}{8}$ N.C. x $1\frac{5}{8}$ -inch cap screws with the flat washers and lock washers at "A," *Illust. 90*, and the three $\frac{3}{8}$ N.C. x $1\frac{3}{8}$ -inch cap screws with the flat washers and lock washers at "B" and tighten all cap screws securely.

Check the lubricant in the belt pulley housing as instructed in the "Lubrication Guide," page 20.

Static electricity in tractors equipped with pneumatic tires doing belt work — The static electricity generated by belt work can be discharged harmlessly by attaching a chain to the tractor and letting it touch the ground.

Belt Pulley Specifications

Diameter (Inches)	Face Width (Inches)	Pulley Speed (R.P.M.)	Belt Speed (Feet per Minute)
*9	$4\frac{1}{2}$	1322	3114
$7\frac{5}{8}$	$4\frac{1}{2}$	1322	2638

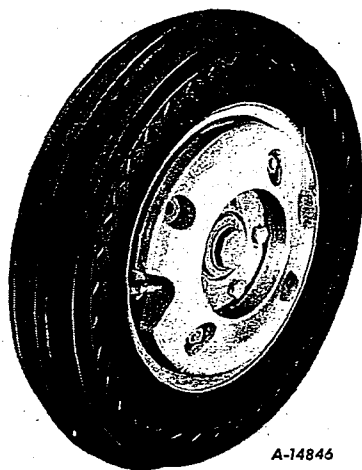
* Regularly supplied with belt pulley attachment.

Front Wheel Weights

The front wheel weights weigh approximately 30 pounds each, and either one or two can be attached to each front wheel. To increase steerability, front wheel weights are recommended for use as a front end counterbalance whenever heavy loads are superimposed on the drawbar, or when heavy equipment is to be mounted on the rear end of the tractor. The front wheel weight attachment includes a set of two weights and the necessary attaching bolts, nuts and lock washers. If additional weight is desired a second set of weights is available for attaching to the first weights.

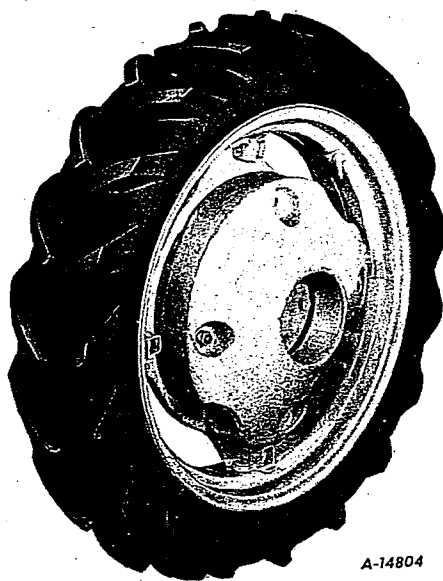
Rear Wheel Weights

Rear wheel weights, weighing approximately 150 pounds each, can be attached to each drive wheel to reduce slippage and increase drawbar pull. Either one or two weights can be attached to each drive wheel. The increase in drawbar pull, with the proportionate reduction of slippage, varies with the type of soil. The rear wheel weight attachment includes a set of two weights with the necessary attaching bolts, nuts and lock washers. If additional weight is desired, a second set of weights is available for attaching to the first weights.



A-14846

Illust. 92—First Front Wheel Weight Mounted on Wheel.



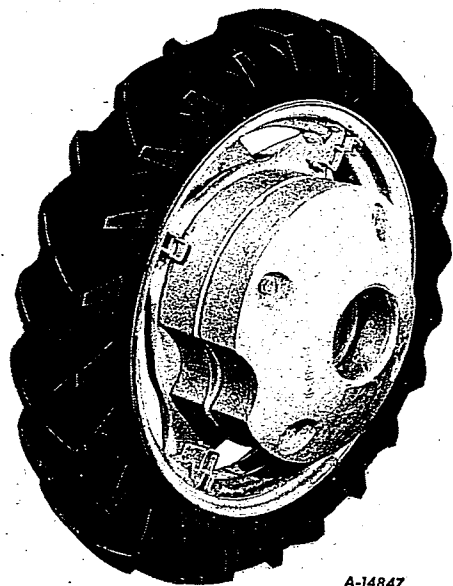
A-14804

Illust. 93—First Rear Wheel Weight Mounted on Wheel.

SPECIAL EQUIPMENT

Before attaching the second rear wheel weights, it is necessary to remove two bolts from each first weight and replace them with the longer bolts provided with the second weights.

If the second weights are removed, replace the two shorter bolts in each first weight.



A-14847

Illust. 94—First and Second Rear Wheel Weights Mounted on Wheel.

Pneumatic Tire Pumps

Enginair or Schrader

These tire pumps are useful where air service is not easily obtained. They may be used for inflating tractor, truck, or automobile tires.

Note: These tire pumps may be used with any carbureted type engine, but they cannot be used on Diesel engines. The tire pumps also are available for various spark plug thread sizes. Specify the size of spark plug thread when ordering.

If these pumps are to be used for inflating tires on a Diesel-powered tractor, a carbureted engine of another unit must be used as the source of power.

To Use—Remove one of the spark plugs from the tractor engine, or any carbureted engine having the correct spark plug thread size, and replace with the pumping element "A." Attach one end of the pump hose "B" to the pumping element and the other end "C" to the valve stem of the tire to be inflated. Start the engine and run it at slow speed for maximum efficiency.

Schrader spark plug tire pump kit—This kit consists of items which are necessary for proper care of the tire valve and maintenance of proper air pressure. With this kit you can maintain tire pressure on all tractors, trucks and passenger cars by changing adapters on the tire pump to suit the spark plug thread size.

The following items are packed in a serviceable metal box:

One tire pump with 16 feet of hose and an air gauge for registering pressure up to 100 pounds.

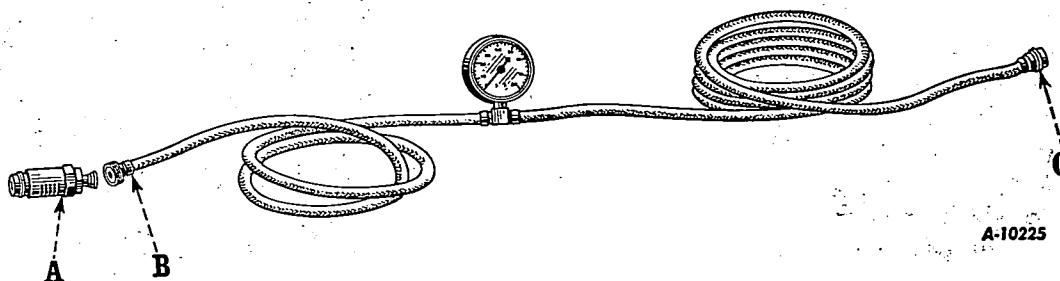
Five adapters for spark plug thread sizes 10 mm., 14 mm., 18 mm., $\frac{7}{8}$ -18 and $\frac{1}{2}$ inch.

Five valve cores and five valve caps which fit all standard tire valves (packed in small metal boxes).

One valve repair tool and one valve fishing tool.

One air-water tire valve and one air-water adapter.

One tire pressure gauge for air-water tractor tires.



A-10225

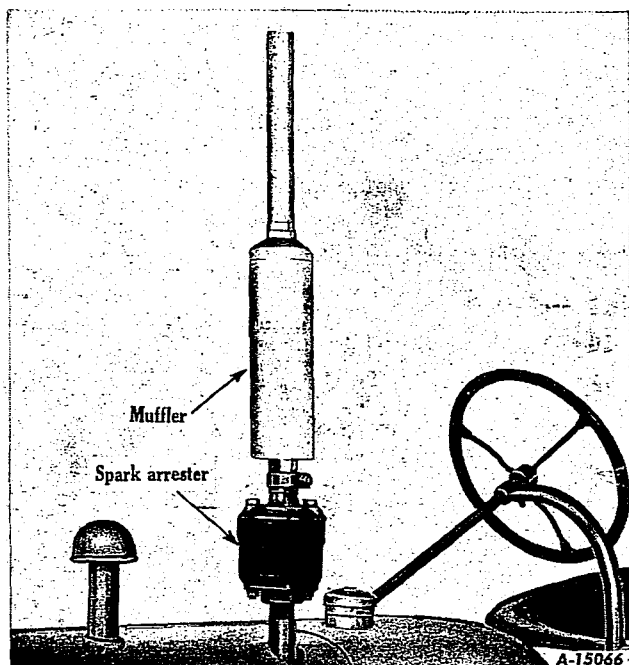
Illust. 95—Enginair Tire Pump with 16-ft. Hose and Air Gauge.

FARMALL CUB

Exhaust Muffler

The exhaust muffler can be supplied for owners who desire quieter operation of their tractors. It reduces the sound of the exhaust to a quiet purr.

The muffler attaches easily to the exhaust pipe and may be attached to the spark arrester attachment in the same manner as it is attached to the exhaust pipe.



Illust. 96—Exhaust Muffler and Spark Arrester Assembled on Tractor.

Spark Arrester

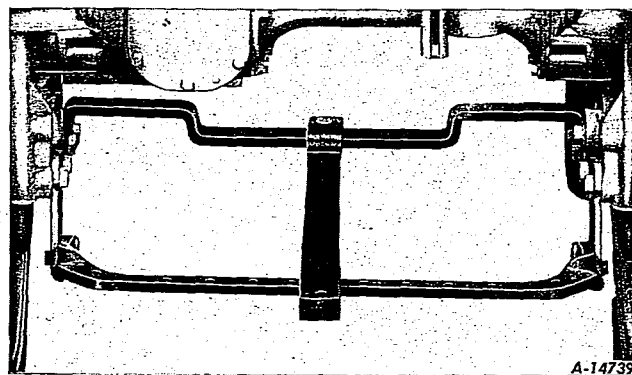
The spark arrester smothers and extinguishes any sparks that may be thrown off in the exhaust. It reduces the fire hazard when operating the tractor near inflammable material. The arrester attaches readily to the exhaust pipe. The muffler is attached to the spark arrester in the same manner it is attached to the exhaust pipe.

Cleaning

Remove the spark arrester once a month for cleaning. To clean, turn the spark arrester upside down and shake it until the loose particles are removed.

Swinging Drawbar

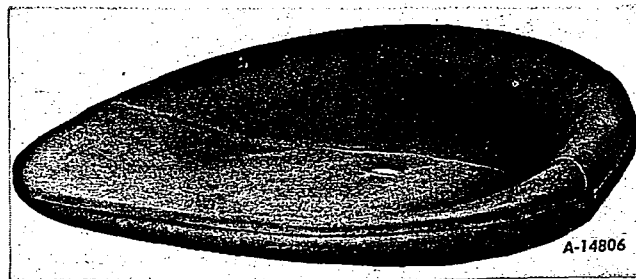
The swinging drawbar is free to swing the full width of the regular drawbar, making it easier to turn the tractor under load when pulling trail-behind implements such as disc harrows. It also facilitates steering on the straightaway when the tractor is pulling a heavy load. The load exerts less sidewise pull on the tractor and therefore interferes less with the steering. This attachment is especially desirable when working in small, irregularly shaped fields.



Illust. 97—Swinging Drawbar Assembled on Tractor.

Detachable Seat Pad

The detachable seat pad, consisting of a hair-felt pad covered by waterproof, rubber-impregnated canvas, is quickly and easily slipped in place and secured by drawstrings over the regular metal seat. It can be used to re-cover the upholstered seat.



Illust. 98—Detachable Seat Pad.

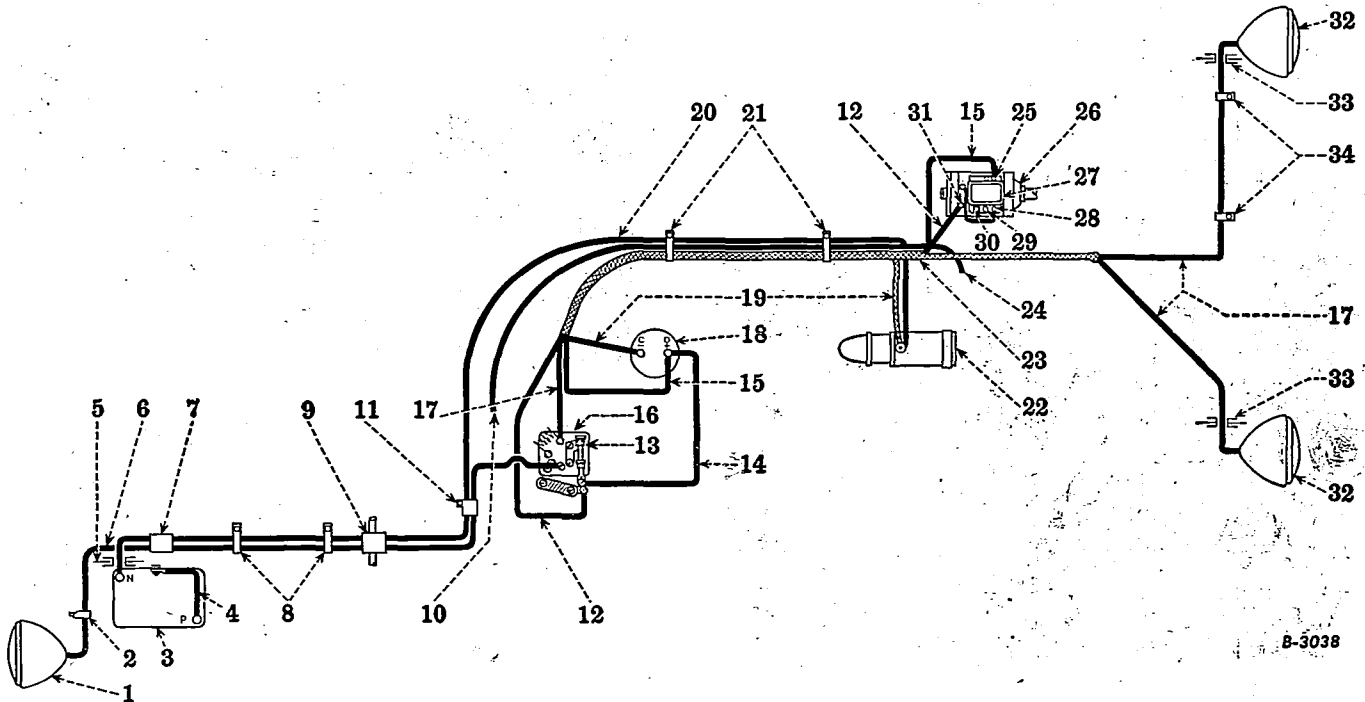
SPECIAL EQUIPMENT

Electric Starting and Lighting

Electric starting is more than a mere convenience to the tractor operator; it eliminates the hand-cranking problem for smaller members of the family who are otherwise entirely competent operators, and is also a fuel saver. It removes the temptation to idle the engine during "times out" to avoid using the hand-crank when work is resumed.

The headlights and rear light greatly extend tractor usefulness. With strong, steady, electric light the tractor can be used after dark and, if necessary, all night, to make up for time lost because of bad weather. It can be used at night to take quick advantage of favorable weather and soil conditions, or to prevent loss of crops overdue for harvest.

Refer to pages 32 to 39 for operating and maintenance instructions.



Illust. 99—Wiring Diagram for Starting and Lighting.

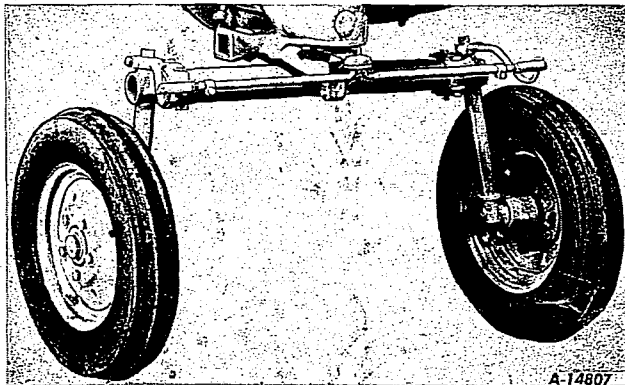
Ref.	Description	Ref.	Description
1	Rear light.	18	Ammeter.
2	Cable clip—on rear lamp mounting bracket upper bolt.	19	Cable—ammeter to starting switch (natural with red tracer).
3	Battery.	20	Cable—battery to starting motor.
4	Cable—battery to ground.	21	Cable harness clips—on inside edge of hood (right side).
5	Grommet—in battery box.	22	Starting motor.
6	Cable—switch to rear light.	23	Cable harness.
7	Wrapping strap.	24	Cable—to magneto.
8	Cable clips—underneath platform.	25	Battery terminal.
9	Wrapping strap—between pedal and clutch housing.	26	Generator.
10	Cable—to magneto ignition switch.	27	Relay.
11	Wrapping strap—inside right side hood support.	28	Generator terminal.
12	Cable—generator field to switch (natural with black tracer).	29	Mounting screw.
13	Fuse.	30	"F" terminal on relay.
14	Cable—ammeter to switch.	31	"F" terminal on frame.
15	Cable—relay to ammeter (natural with black and red cross tracers).	32	Headlight.
16	Lighting switch.	33	Grommet.
17	Cable—switch to headlight (black).	34	Cable clips—on upper corner of fan housing.

FARMALL CUB

Adjustable Front Axle

The adjustable front axle attachment replaces the regular fixed front axle. The variable treads of $40\frac{5}{8}$, $44\frac{5}{8}$, $48\frac{5}{8}$, $52\frac{5}{8}$ and $56\frac{5}{8}$ inches permit adjustment to fit most any row crop ranging from narrow rows of vegetables to wide rows such as cotton and corn.

For instructions on adjusting the tread widths, refer to page 46.



Illust. 100—Adjustable Front Axle.

Upholstered Seat

The upholstered seat attachment gives the maximum in riding comfort. This seat carries a thick layer of hair felt covered by durable, waterproof rubber-impregnated canvas. It holds the operator in the seat and keeps him from sliding around when traveling over extremely rough ground.



Illust. 101—Upholstered Seat.

SPECIFICATIONS

Capacities

Fuel tank.....	7½ gal.
Water cooling system.....	9¾ qt.
Crankcase pan.....	3 qt.
Transmission case.....	3½ pt.
Rear axle drive housing (each).....	2 pt.
Steering gear housing.....	¾ pt.
Air cleaner oil cup (Donaldson).....	½ pt.
Air cleaner oil cup (United).....	¾ pt.
Belt pulley housing.....	⅓ pt.

Engine

Cylinders.....	4
Bore.....	2⅝ in.
Stroke.....	2¾ in.
Engine speed (governed, maximum full load).....	1600 r.p.m.
Magneto (clockwise rotation).....	I. H., Type J-4
Spark plug (Champion No. 15A or AC87).....	Gap... .023 in.
Valve clearance (engine cold).....	.013 in.
Carburetor.....	I. H., ¾ in., updraft

Clutch

Single plate, dry disc, spring-loaded.....	6½ in.
--	--------

SPECIFICATIONS

Belt Pulley and Power Take-Off

*Pulley speed.....	1322 r.p.m.
*Belt speed (with 9-in. pulley).....	3114 ft. per min.
*Pulley diameter.....	9 in.
*Pulley face.....	4½ in.
*Power take-off shaft speed (counterclockwise rotation).....	1600 r.p.m.

*Fuse and Head Lamp Bulbs

Fuse (cartridge type).....	I. H. No. 10815 VA.....	3AG—20 amperes
Headlight bulb.....	I. H. No. 27369-D (Mazda 1133).....	{ 6-8 volt 32 candlepower

*Furnished when ordered.

Foot Brakes

External contacting on drums.

Transmission (three speed)

(Speeds based on 7—24 pneumatic tire size).

Speed (miles per hour): 1st.....	2
2nd.....	3
3rd.....	6⅛
Reverse.....	2¼

Wheels and Tread

Front wheels, pneumatic tire size.....	†4.00—12
Rear wheels, pneumatic tire size.....	†7—24
Wheelbase.....	69⅜ in.
Tread, front (standard—fixed axle with reversible wheels).....	40⅝ and 46⅜ in.
Tread, front (adjustable front axle, 4-in. intervals).....	40⅝ to 56⅝ in.
Tread, rear (adjustable—reversible wheels and rims, 4-in. intervals).....	40 to 56 in.

†Other pneumatic tire sizes available.

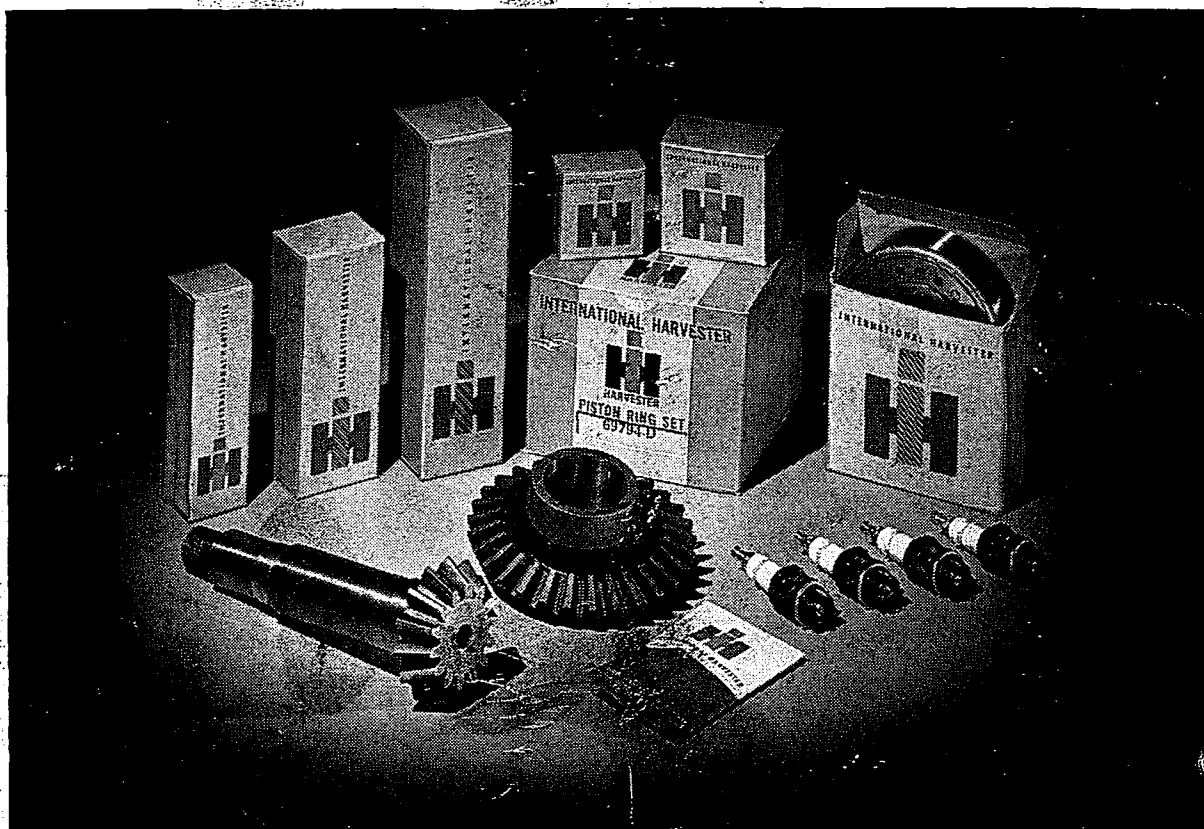
General—Dimensions

Length over all.....	98½ in.
Width over all—minimum treads.....	47¼ in.
Width over all—maximum treads.....	63⅜ in.
Height over all (to top of steering wheel).....	62½ in.
Ground clearance for crops: Under front axle.....	20⅜ in.
Under rear axle.....	19⅝ in.
Drawbar (adjustable): Normal height.....	12⅝ in.
High and low positions.....	10⅝ and 14⅝ in.
Lateral adjustment.....	11⅞ in. on each side of center hole
Minimum turning radius with minimum treads:	
Without brake applied.....	9¼ ft.
With brake applied.....	8¼ ft.

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MEMORANDA



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